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A Special Report

At the September meeting of the Board of Trustees, James A. Campbell, M.D., was named president emeritus after 19 years as president of Rush-Presbyterian-St. Luke's Medical Center. Donald R. Oder, senior vice president and treasurer, was named acting president.

Harold Byron Smith, Jr., chairman of the Board of Trustees, is heading a committee to find a successor to Dr. Campbell. In a tribute to Dr. Campbell, Mr. Smith said "it has been a great presidency.

"He came here as a young cardiologist thirty-five years ago to take care of patients. He has been taking care of them ever since. During his term as president, some half million patients have been given care in our hospitals.

"From the beginning, he became known for the power of his inspiration, the brilliance of his innovation and the wisdom of his implementation. He did not change. In his presidency, however, these qualities changed us all. They gave our institution a new mission and a vigorous capacity to pursue it.

"Some of his accomplishments stand out in terms of comparison with past achievements, while others stand alone because there is literally nothing to compare them with in the past.

"In the period of his presidency, patient days reached the astounding total of five and one-half million. We are today taking care of 30,000 patients a year.

"Our bed total stands today at 1,265. That is almost fifty percent more than in 1964.

"In 1964, open heart surgery was just beginning. Today, more open heart procedures are done at Rush-Presbyterian-St. Luke's than any other institution in the region.

"At that time coordinated new therapies for cancer were just appearing. Today, one of every five of our beds is devoted to a cancer patient who is being cared for by a team of specialist physicians.

"Twenty years ago our surgeons performed 13,500 operations a year.

Today, they are doing some 4,000 more than a score of years ago.

"Our medical staff has doubled, residents and fellows tripled.

"From 2,500 employees we have gone to 7,500, putting the Medical Center among the top 25 employers in Chicago.

"The budget has grown fifteen times in this period. It is now over \$300 million for 1983-84.

"The assets of the Medical Center have grown from \$68 million to nearly \$400 million—almost a six-fold increase.

"In 1964, there was only one named chair at the Hospital—the Jean Schweppe Armour chair. Today, there are 30. Our endowment has grown three and a half times. It is now over \$70 million.

"Over \$155 million in philanthropy has been received since Jim became president. Eighty percent—\$120 million—has come to support this institution in the last decade alone. Two-thirds was provided by the Campaign for the Future of Success which ended last year.

"These are some of the statistics of achievement.

"These achievements are solid, coordinated, inter-related, planned and balanced. They are intelligent and structured. They will stand the test of time.

"Jim Campbell's leadership has come from his self-imposed standard of excellence:

"As a physician in caring for patients,

"As a cardiologist in his specialty,

"As a peer with his colleagues,

"As a scholar with his contemporaries,

"As a teacher among teachers,

"As an inspiration for his students,

"As the guiding spirit of a vast organization,

"As a visionary with the deepest respect for the pragmatics of planning and finance.

"As our Chief Executive Officer, he perceived, evaluated, prepared us for and steered us through the technological and scientific com-

plexities and the perplexing social and fiscal policies we have dealt with so successfully for the past twenty years. He kept before us the unity within the diversity of health care delivery.

"In all and above all, Jim Campbell stands for excellence.

"All—because he has put the patient first.

"There are further actions I would ask of this Board...

"Jim Campbell will remain a Trustee and we will have his active counsel in that capacity... At this Board meeting we have the privilege of electing him for another three-year term.

"As Chief Executive Officer, he merits the designation of President Emeritus of Rush-Presbyterian-St. Luke's Medical Center and Rush University effective September 15, 1983.

"He continues as a member of the Medical Staff and this Board should confirm his appointment as a consulting physician of Presbyterian-St. Luke's Hospital.

"His continuing commitment to Rush Medical College requires confirmation of his appointment as a professor on its faculty.

"One aspect of his achievements in higher education is recognized in the James A. Campbell, M.D., Distinguished Service Professorship, the first such chair in Rush University.

"And finally, in our capacity as Trustees of Rush University, I propose that we take still another action. The responsibility of awarding honorary degrees, the highest recognition which the University can give, rests with this Board.

"I propose that we bestow Rush University's highest honor on James A. Campbell, M.D., who conceived, organized and inspired Rush University, by awarding him an honorary Degree of Humane Letters, at a commencement of his choosing, for his contributions to patient care, teaching, research, and management to comfort, to heal, to cure and to open life to its great potential."

Mr. Smith's motion was seconded by A. B. Dick III on behalf of the past chairmen of the Medical Center and was approved with a standing ovation.

In his final president's report, Dr. Campbell cited circumstances and issues around which health care delivery in this country cluster: corporate responsibility, health care systems, people in the health sciences and in health care, and resources for health.

Dr. Campbell stressed that although the Medical Center "is a special type of corporation with a distinctive mission in our society, (it is) not exempted from corporate responsibility." And, although the corporate form is now being adopted by hundreds of health care institutions, he pointed out at Rush-Presbyterian-St. Luke's Medical Center the corporation was expanded and reorganized in 1969.

"Our medical staff, nurses, scientists, professionals and employees have a sense in which they are working in an integrated way, a unified way, toward the common objective of keeping patient care our top priority. We have been cost conscious. We have never had an operating deficit. We have generated our own working capital. We have a debt ratio that will not hamper the freedom of decision of our successors. We do not have to wait for outside voices to ask, 'Are you a responsible corporation?'"

The issue of health care systems, Dr. Campbell said, is "not one solely of for-profit or not-for-profit institutions, of vertical or horizontal organization. In this country and for us Americans it is probably a mixture of all these elements. At the Medical Center we perceived this issue and organized ourselves to meet it long before its present prominence in national debates. Our initial attempts to provide system created a network of bilateral contractual arrangements with 15 other health care institutions and 15 other colleges and universities. Our hopes were high and they have not yet been met. However, we are more than prepared through this first phase of building a system to become the strongest advocates for



Shown at unveiling of portrait of James A. Campbell, M.D., commissioned by current and past chairmen of the Trustees: (from

left) Harold Byron Smith, Jr., chairman Dr. Campbell, and Albert B. Dick III, past chairman.

the next phase of development. The next phase will require a more serious recognition of the dependence of institutions one upon the other and of their selecting one another to share their destinies."

He stressed, too, the need for the "highest quality human talent if we are to continue the biological and technological progress in the health fields... It is not many years ago that our concern as a nation was for the production of more physicians and nurses. The expectations today put an increasing emphasis on what the students are taught, how they learn and how they will maintain their professional standards throughout their careers. Rush University represents our response to the obligations to address the requirements of this human revolution in health care."

With regard to resources for health, Dr. Campbell pointed out that the question we as a country must ask is "how much do we want to spend and on whom?" The concern that medical care "costs too much," he said, was an indication of the more fundamental issue of resource allocation and the method by which it is done in our country.

"At the moment the dominating direction seems to be the introduction of competition into the health field. Within our own enterprises we have encouraged a variety of approaches to the delivery of health care. We have never wavered in our support of the private practice of medicine. Our faith lies in the private practitioner as the back-

bone of the institution. There has been no contradiction in opening up other modalities of care. One of the most outstanding is our health maintenance organization ANCHOR, now rapidly approaching 100,000 members. It is one of the most successful HMOs in the country.

"On the basis of our experience we have suggested to the State of Illinois that great economies can be achieved in the introduction of the HMO principle for the medically indigent."

Dr. Campbell also touched briefly on what he called the "newest alphabetical affliction in medicine"—the DRG, Diagnosis Related Groups. The 467 diagnostic groups created by the federal government, put a price tag on each diagnosis, indicating what the government proposes to pay no matter what the course of treatment in an institution requires.

"The academic health care centers, such as Rush-Presbyterian-St. Luke's, will, without question, be penalized because of the intensity of care required by their patients. The new program proposes to treat patients as admission statistics and we know that no program at Rush-Presbyterian-St. Luke's can allow that to occur.

"These issues challenge our dreams, our creativity, our commitment, and our performance.

"As Mr. Churchill once said: 'Now this is not the end. It is not even the beginning of the end. But it is, perhaps, the end of the beginning.'"

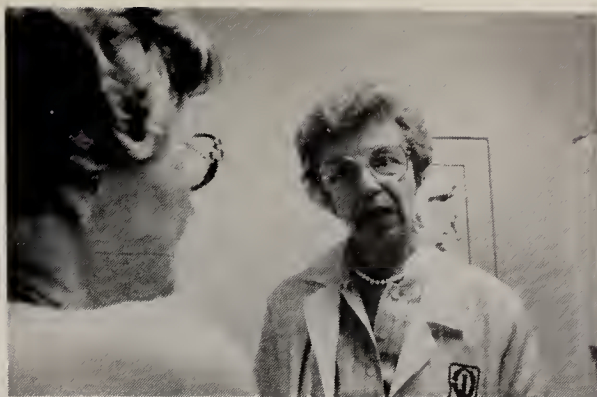


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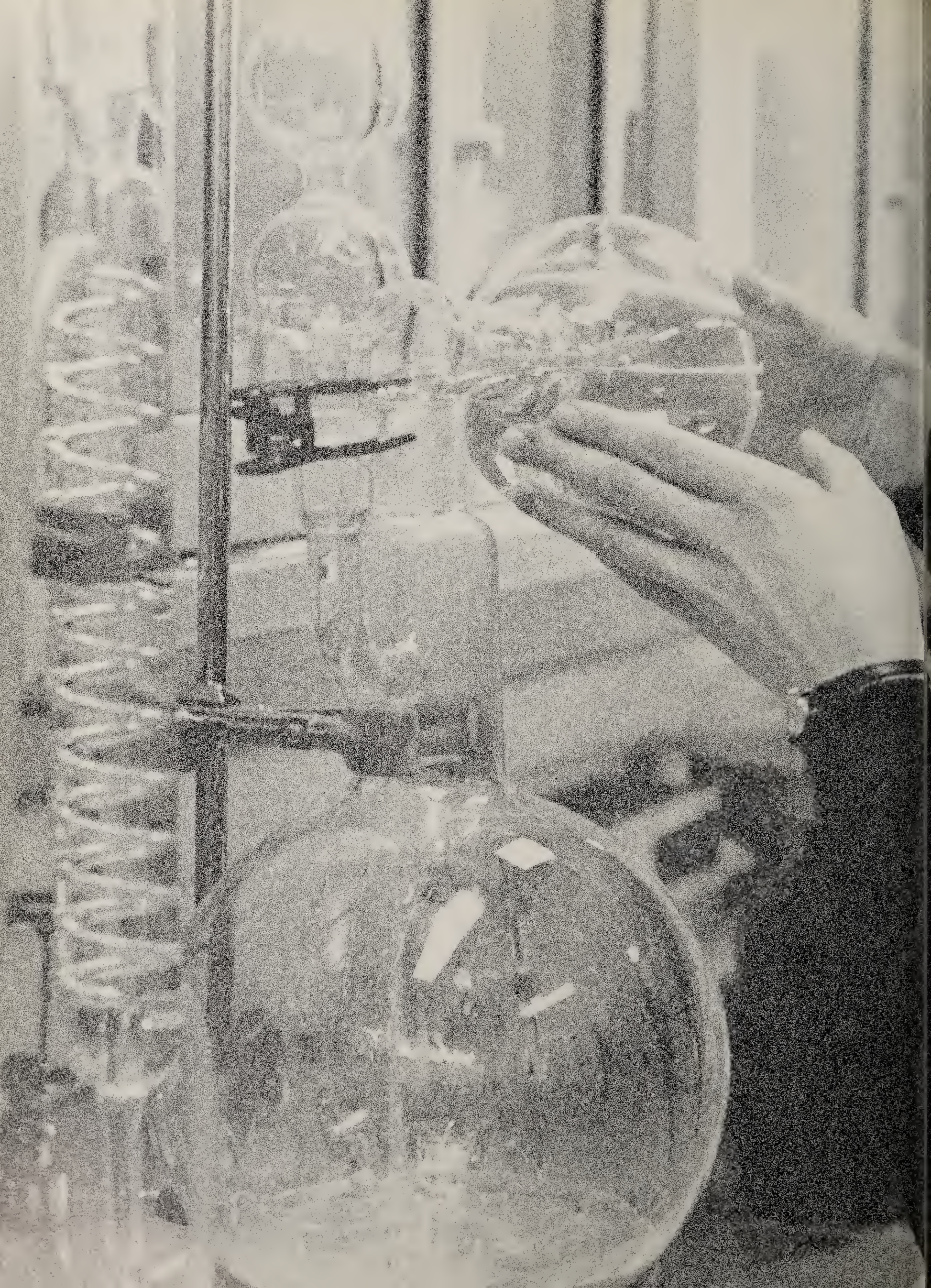
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On the cover: The portrait of James A. Campbell, M.D., is the work of artist Albert K. Murray.



Research and the Researchers: Seeking the Light at the End of the Tunnel

By Carolyn Reed

Research: Entrance to the "Promised Land"

Nearly every day (or so it seems), another story in the newspaper hails a medical breakthrough, or a new finding pertinent to the diagnosis or treatment of one of the perennial dread diseases.

And buried in the final paragraphs or at the tail end of the 30-second news spot, the omnipresent researcher makes cryptic qualifying comments, intones that the findings are "preliminary," and that it will take considerable "further study" before the true significance of the work described may be known. Hopes are raised and then dashed in a matter of so many seconds or column inches. And raised again in tomorrow's news.

Who are these people—biomedical researchers—who know so much yet always need to know still more, and in whom we place all our hopes for a cure for cancer, arthritis, heart disease, multiple sclerosis? And what are they doing in their laboratories, at their computers: is it science, or a kind of magic that provides them so many small victories and propels them on to still larger questions?

Robert S. Eisenberg, Ph.D., the Francis N. and Catherine O. Bard professor and chairman, Department of Physiology, is one of them. Says he, "We've broken into the 'promised land'...we are right now in the midst of momentous discoveries even as governmental support for biomedical research dwindles."

It's been 30 years since Watson and Crick described the protein molecule deoxyribonucleic acid, DNA, as the "building block of life." Since then, researchers have uncovered the thousands of proteins which are the source of all tissue function,

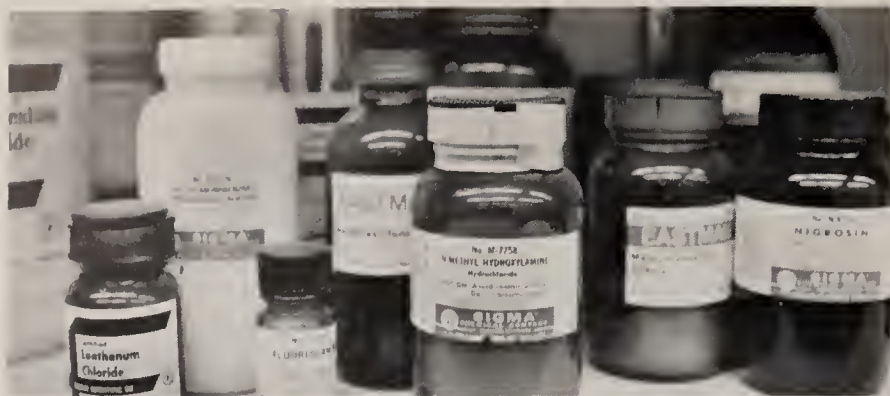
all growth and repair. Says Dr. Eisenberg, "We have the technology now to unravel how every one of these proteins works. How long it will take, I don't know, but it is a finite process. The complexity of the body, large as it is, is finite. Then we will know all there is to know about health and probably disease."

Dr. Eisenberg knows that time is still some way off. In the meantime, however, he and other researchers continue the research process, in laboratories and in clinical settings, day after day, step by step. Rush-Presbyterian-St. Luke's Medical Center has a strong core of basic scientists, like Dr. Eisenberg, working on fundamental biomedical problems, and a larger, equally qualified faculty of clinical investigators (physicians and nurses). These people test and retest and analyze data on various drugs, devices and lifestyle factors, searching for new clues as to why and how disease develops and can be conquered. We talked with six of them. What follows is their assessments of the state of their science, where they are going, what they hope to accomplish and why they care.

Types of Research: A Primer

All biomedical research falls into certain descriptive categories, usually defined as *basic*, *developmental* and *applied*.

Basic (or "fundamental") research is probably what most of us think of when we hear the term "research": work done in the laboratory, using tissue cultures, test tubes and microscopes, mice, rats, and rabbits. Basic researchers are trying to understand basic mechanisms of specific body functions, tissues, or cells. Their interest is as much



fired by a love of learning and the challenge of the unknown as it is motivated by medicine's need to understand what goes wrong in various disorders or disease states.

Dr. Eisenberg's laboratory studies the electrophysiology of skeletal muscle tissues. "We're interested in how one membrane in a muscle fiber tells another membrane to tell that fiber to contract. It may be a key link in one kind of disease, called myotonic dystrophy. Or it may be a control link in how the heart regulates its output, we don't know."

The point, however, is to find out as much as possible about muscle fiber contraction and what's going on inside those cells, and how the protein molecules in those cells affect function. "We don't know how the proteins link up to function. That will be the question we ask professionally for the next twenty years." And, in so doing, Dr. Eisenberg and his colleagues should be able to pinpoint exactly where in the process things can go wrong.

"Once you know where the disease is, you can begin to design ways to get in there and change it. It's very unlikely you'll design a chemical cure if you don't know where the disease is," says Dr. Eisenberg.

Klaus E. Kuettner, Ph.D., is the John W. and Helen H. Watzek professor and chairman of the Department of Biochemistry. Dr. Kuettner's laboratory takes an equally focused look at the biochemistry of connective tissue. Inherent in a total understanding of how cartilage builds, ages and destroys itself, he says, is the answer to the crippling joint diseases such as osteoarthritis.

"Forty-five million patients suffer from some sort of arthritis," says Dr. Kuettner. "Come the 1990s, I think the majority of governmental re-

search funds will emphasize research in crippling diseases. Right now, all medicine can do is treat the symptoms, but maybe in the future, we can get the tissue to repair itself."

The answers are slow in coming, in part because there is no animal model to study, and the disease itself is chronic rather than acute. "Arthritis takes up to thirty years to develop and we can't speed up the process," says Dr. Kuettner. So he and his colleagues study isolated systems, seeking to recreate in the lab portions of the process, in tissue and in cell cultures.

Another reason for the seemingly slow pace of progress in research generally is the complexity of what's under study. "Nothing in nature is simple," says Dr. Kuettner, "and there are very few isolated processes. Rather, what occurs is built into cascades of activity."

The blood clotting mechanism is a good example. It appears that only a few things happen when

blood clots. Not so, says Dr. Kuettner: "It's the most complicated cascade ever described, with about 17 separate steps. Why did nature build the cascade? Because it offers 17 ways to control or block or speed up the process."

"What's wrong in disease?" asks Dr. Kuettner. "One of the control mechanisms has gone awry. As researchers, we're trying to find which one."

The devastating infectious diseases of the past—tuberculosis, lobar pneumonia, typhoid fever—each had a single organic cause, though they looked as multifactorial as today's cancers and heart disease. But many basic researchers like Drs. Eisenberg and Kuettner suspect today's killers also have single causes, if the mechanism that's gone askew can be unraveled.

Developmental research derives from basic research, in that the new insights and findings uncovered in basic research studies become the building blocks for further studies



Klaus E. Kuettner, Ph.D.

"Once you know where the disease is, you can begin to design ways to get in there and change it"

Robert S. Eisenberg, Ph.D.

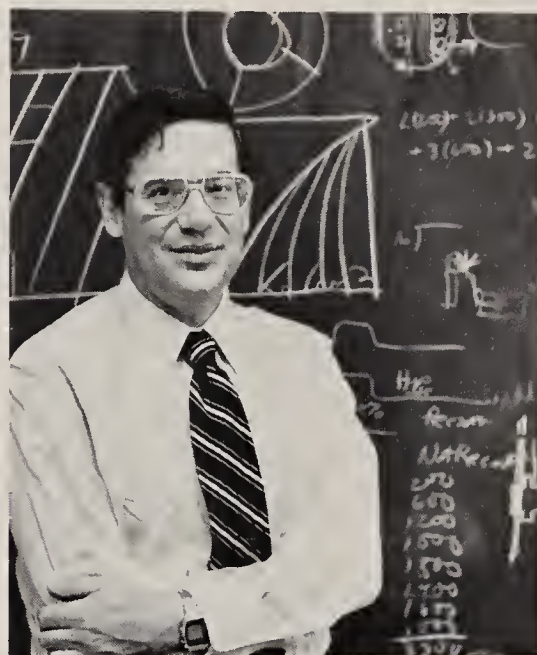
centering on intervention with new drugs, treatments, and/or devices.

At the Medical Center, the Office of Consolidated Laboratory Services (OCLS), under the direction of Frank E. Trobaugh, Jr., M.D., the Elodia Kehm professor of hematology and director of the Section of Laboratory Hematology, has been created in part to coordinate and support developmental research in cooperation with departmental laboratories. Close cooperation and/or collaboration between investigators and physician-scientists is encouraged to help translate new information from basic research findings into practical tools (e.g.

diagnostic tests) for clinical purposes. Specifically, new assay techniques are used, new laboratory procedures are evaluated and new laboratory equipment is tested through the developmental activities of OCLS.

In the Medical Automation Research Unit, basic knowledge from the nonbiological field of engineering is applied to medical problems. James Bacus, Ph.D., senior scientist and professor, internal medicine directs the unit.

"We're involved in the area of artificial intelligence, machine intelligence, and, in general, the interpretation of natural medical images



Robert S. Eisenberg, Ph.D.

A Glossary of Research Terms

Basic Research:

Also referred to as "fundamental" or "bench" research. Concern is for new knowledge and understanding of basic biological mechanisms.

Developmental research:

Information garnered from basic research is used to develop practical, effective new tools for the diagnosis and/or treatment of disease.

Applied research:

Also referred to as "clinical" research. Takes knowledge obtained from basic and developmental research (drugs, devices, therapies) and tests it on human beings in a clinical setting.

Randomized clinical trial, double-blind:

An RCT is generally accepted as the most valid way to assess therapeutic regimens. Patients are randomly assigned to one of two or more study groups. Patient may not know which treatment regimen he/she is getting. If both doctor and patient don't know, the study is considered double-blind. The purpose

is to eliminate bias on either's part (doctor or patient.)

Case-controlled, uncontrolled studies:

The investigator starts at the end rather than the beginning of the cause-effect pathway. One group of persons (the cases) who have the disease in question is compared with a similar group (the controls) who don't have the disease. The histories of each are reviewed retrospectively and compared in an effort to discover a cause for the cases' disease. Case-controlled studies may be done for practical reasons in that the disease under study is rare and it would take too long to study a group of people prospectively, to see who would get the disease in the future. Or it may be unethical to undertake an RCT, as in the case of a drug study where researchers are already quite certain the substance does work and therefore do not wish to withhold it from anyone.

A study is uncontrolled if the investigator simply studies the

case, i.e. has no comparative data.

Case-controlled and uncontrolled studies are vulnerable to considerable bias either on the part of the investigator or the patient.

Peer review:

The process whereby a group of researchers evaluates the work of an individual researcher, usually in connection with obtaining or renewing a grant. Peer review committee wants to know: Is the question properly asked? Is the methodology used adequate? Can the answer promote progress in the field? Is the scientist efficient?

Placebo, placebo effect:

Inert substance sometimes given to a study group of patients as part of a controlled drug study. Patients are said to exhibit the "placebo effect" when their health status improves despite the fact the substance they're taking is inert.

Protocol:

The precise steps the researcher should follow in carrying out an experiment or study.



by artificial intelligence," says Dr. Bacus.

Over 10 years ago, he and his colleagues realized that they could link an automatic microscope to a computer and have it read blood slides with the precision of the best human technician. What they developed in prototype has become the L.A.R.C.: the Leukocyte Automated Recognition Computer system, marketed to hematology labs around the world.

"This white blood cell analyzer was really one of the first 'robots,' if you will...industry is only now beginning to use robots in factories, but these robots operate with the same television eye to look at a particular field as ours did 10 years ago."

Dr. Bacus' group has since developed software for a new red blood cell analyzer, and is doing developmental research in the area of Pap smear screening.

With regard to the red cell analysis, "the difference now is that we can come up with a specific diagnostic profile. In addition to classifying the (red blood) cells, the

printout provides a list of what the most likely diagnoses would be." Dr. Bacus predicts that in the not too distant future, virtually all diagnostic testing will be done automatically, using computers.

Applied research (often called "clinical" research) takes such newly developed devices, drugs or procedures, and tests them, first with smaller and then larger patient populations. The L.A.R.C. system underwent extensive testing of its accuracy in institutions other than Rush-Presbyterian-St. Luke's Medical Center. The red cell analyzer is currently entering into this testing phase.

New drugs and procedures for a variety of diseases and conditions are being tested at Rush and other institutions all the time.

In 1980, the Clinical Pharmacology Unit, under the direction of Catherine M. MacLeod, M.D., assistant professor, internal medicine and pharmacology, was created to conduct in-depth drug testing in healthy subjects and ambulatory patients. The unit works closely with

major drug firms to evaluate investigational new drugs.

Recently, Medical Center researchers participated in highly publicized clinical trials of the controversial disc-dissolving enzyme, chymopapain. The experience with chymopapain over the years provides a telling example of how difficult and drawn-out the testing process can be. Ten years ago, the enzyme was widely tested, but failed to obtain Food and Drug Administration (FDA) approval because one study's conclusion showed it no more effective than a placebo. Many experts now say that study was flawed.

William F. Hejna, M.D., professor of orthopedic surgery and Walter W. Whisler, M.D., Ph.D., chairman and professor of neurological surgery, were principal investigators on the latest, nationwide study, a tightly monitored, double-blind, randomized trial which verified the enzyme's efficacy in the treatment of herniated (slipped) lumbar discs.

Joseph V. Messer, M.D., is professor, internal medicine, and director of the Section on Cardiology, where recently the enzyme streptokinase (to dissolve potentially fatal blood clots near the heart) and a new catheterization procedure to clear clogged arteries, percutaneous transluminal coronary angioplasty (or "balloon angioplasty"), were tested. Each has since received FDA approval for general use in specific types of patients.

"The toughest kind of research to do is clinical," says Dr. Messer, "for obvious reasons. You're dealing with an experimental subject who demands great respect and care and management. You've got to deal with the disease the patient has as well as meet the rigorous requirements of the study's protocol..."



James W. Bacus, Ph.D.

*"In disease one of the control mechanisms has gone awry.
As researchers we're trying to find which one."*

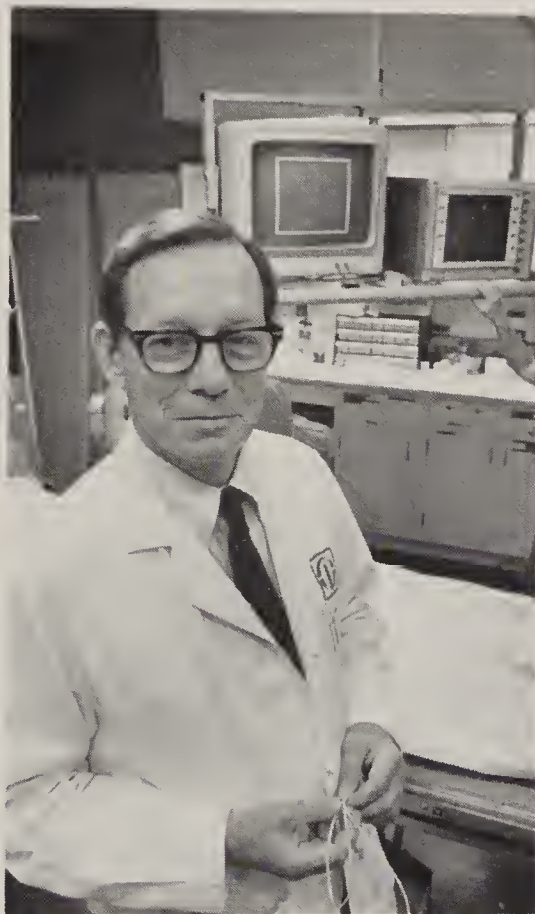
Klaus E. Kuettner, Ph.D.

Drug trials in particular take a long time due to stringent FDA regulations. According to Janet Wolter, M.D., professor of internal medicine and an oncologist (cancer specialist), all new drugs must undergo three phases of testing in humans before being approved for general use. Phase 1 trials look only at toxicity; Phase 2 trials determine proper dosage; and Phase 3 trials, (the largest), conducted once dosage and efficiency are established, test the new drug against either the best known other treatment or against a placebo.

"If the drug is for a type of cancer (patient) who walks in your door only once a month, it can take quite a long time to get results," says Dr. Wolter. The Medical Center, like other major cancer treatment facilities, belongs to several regional and national cooperative cancer study groups; drug testing is usually a group effort, with the findings from several centers pooled together.

According to Dr. Wolter, it is often hard for sick patients to understand the importance of clinical trials. "The best way to truly test the efficacy of a new drug or procedure is a prospective randomized trial (Phase 3). When this is done, I have to tell the patient I don't know what drug they'll get or which is best because I really don't know. Suddenly the patient realizes I don't have all the answers. And that's a difficult moment."

Dr. Wolter adds that not every patient elects to participate in a clinical trial. It is, ultimately, the patient's choice. Many, however, aren't suitable candidates. Dr. Wolter estimates only about 10 percent of the patients she sees are suitable: others may simply live too far away to come in regularly; they may be too heavily pre-treated with other



Joseph V. Messer, M.D.

drugs; some don't have precisely the right cancer, and some cannot accept randomization. Those not in a trial receive the best available standard treatment for their disease. (Often it is that standard treatment which the new one is being tested against.)

There are some rewards for those who do participate. "I think a lot of patients go into a trial with the idea they're going to be a research partner with the doctor, finding out something new. And they are. As an investigator, I feel good because perhaps I can benefit the patient immediately; but, whatever happens, our work certainly moves medicine at least a tiny notch forward. And that's more satisfying than waiting until you get the *Journal* (of the American Medical Association), read the paper there, then change your mind about your treat-

ment preferences."

While researchers like Drs. Wolter and Messer test new treatments and devices in individual patients, other clinicians analyze data from hundreds of patients, looking for important clues about disease etiology and disease trends. Epidemiology (population studies) is a branch of clinical research, long used to direct public health efforts. Epidemiologic findings are suggestive, not definitive. But, according to James A. Schoenberger, M.D., professor and chairman, Department of Preventive Medicine, in certain cases they are the only way to home in on a particular disease cause. It has been through population studies over the past twenty years that so many "risk factors" have been identified.

"Epidemiologic data gave us the first clue linking cigarette smoking and asbestos exposure to mesothelioma of the lung. Looking through a microscope would never have told you that." Dr. Schoenberger also cites population data that linked smoking's rise in popularity after World War I with a concomitant rise in lung cancer incidence beginning after World War II.

"You can't explain everything, but the clues are there (in population data) and the trends are fascinating. Coronary disease is down 27 percent in the U.S., but in countries like Hungary and Poland, it's gone up some 60 percent!"

"I think epidemiologic data have not been fully explored in cancer, the way they have been used in heart disease," says Dr. Schoenberger. Indeed, epidemiologic data have been the basis for some of the largest and longest clinical trials in recent years, specifically the MRFIT (Multiple Risk Factor Intervention Trial) program. And the

on-going Western Electric Study continues to provide clues linking diet, personality and other environmental factors to heart attack and cancer risk.

The Future of Research

Since the 1950s the federal government (through the National Institutes of Health) has supported most research activity. In recent years, however, while the total federal dollars allocated has continued to grow, so have the numbers of grant applications; as a result the percentage of projects ultimately funded is down. (Rush has bucked this trend; over the past ten years, total dollars awarded and the number of projects underway at the Medical Center have continued to grow.)

Other forms of financial support are emerging: private philanthropy, and new ventures between private

industry and universities. And general public awareness and support appears to be growing as well. Witness the proliferation of these popular magazines on the newsstands: *Discover Magazine*, *OMNI*, *Science '83*, *Psychology Today*, *GEO*, *American Health* and others like them.

"I think the public does understand (this need for more research)," says Dr. Eisenberg. "Nearly every person knows of some 'miraculous treatment' that has prolonged the life or decreased the suffering of someone they know...and they know it comes from science.

"I feel extremely lucky to be alive at this time, because this set of (research) problems won't exist a hundred years from now. They'll be solved, like those in physics a hundred years ago."

Adds Dr. Schoenberger, "When I started my career, there were few specific treatments. Heart disease

was considered inevitable.

"And now: I think we're going to repeat the amount of new knowledge garnered over the last 40 years in the next ten! I can hardly wait."



James A. Schoenberger, M.D.



Janet Wolter, M.D.

A Tradition of Sharing in Discovery

From its beginnings in the early 19th century, Rush-Presbyterian-St. Luke's Medical Center (RPSLMC) has been identified with a tradition of education and research leading to excellent patient care. Great names in the history of American medicine—Brainard, Byford, Fenger, Senn, Hektoen, Billings, Herrick, and Bevan—were among those in the Rush tradition whose contributions were widely disseminated throughout the medical and scientific communities and helped shape a nation's response to overcoming many health problems of the past.

Today that tradition lives on and has kept the Medical Center in the forefront of the nation's academic medical centers in addressing the major medical issues of our society. In the past year alone, Medical Center physicians, scientists and other health professionals were engaged in some 980 research projects. Findings reported in over 850 publications were shared with others with the same concerns, thus assuring that the benefits of new knowledge are brought to the patient's bedside in the shortest time possible.

Rush-Presbyterian-St. Luke's has conscientiously nurtured its research tradition. It has found that the opportunity to do meaningful research often is the prime incentive attracting outstanding practitioners to its staff, thereby enhancing the quality of patient care. While proud of its contributions to pure research and fundamental knowledge, the Medical Center nevertheless has continued its major thrust toward applied research—"targeted research" in its finest sense.

Research at the Medical Center also is increasingly characterized by its multidisciplinary approach in which the skills and expertise of different specialties are brought to bear on specific clinical problems. In fact, one out of every five research projects currently involves

two or more medical departments.

Last year, over \$10 million was earmarked for research at the Medical Center. The single largest category of research awards at the Medical Center is for preventive medicine, underscoring the emphasis on keeping people healthy in the future. But urgent research needs concern present health problems. Heart disease and cancer are the nation's two leading killers and these "facts of life" are reflected not only in the patient population of Rush-Presbyterian-St. Luke's as a major referral center but in its research priorities as well. Cancer research projects totalled 126 last year, followed by cardiovascular disease, 123, and neurological disease, 85. The remaining 600-plus research projects covered just about every health problem in our society, from the relatively simple to the most complex.

Research challenges are manifest in a number of areas: Getting at the basic biological and behavioral causes of diseases and their epidemiology; developing new techniques, materials, devices and technology for more effective and less costly diagnosis and treatment; evaluating different treatment methodologies, the efficacy of new drugs; monitoring ways of delivering health care; seeking better understanding of the problems of aging and of emotional illness. With such issues a constant challenge and the patient care mission of the Medical Center an immediate responsibility, the stimulus for progress in both endeavors is ever present.

The Medical Center has an outstanding array of facilities and programs that make feasible a wide range of productive research, from its Johnston R. Bowman Health Center for the Elderly on the main Medical Center campus to the Sheridan Road Hospital on the north side of Chicago to the Keeshin Biomedical Systems Planning Cen-

ter near Eagle River, Wisconsin; from the Library of Rush University to the William Noble Lane Medical Research Organization; from its new Graduate College to prepare skilled researchers in the basic biological sciences, its John L. and Helen Kellogg Center for Excellence in Nursing, from its numerous centers dedicated to cancer, multiple sclerosis, bone marrow transplantation, mental health, eye care, scoliosis, and sleep disorders, among others, to its patient care network of affiliated hospitals.

The major research resource, of course, is the people who have elected to come to the Medical Center because of what it offers in opportunities to provide outstanding care and to do productive research.

The Medical Center's progress in patient care, education and research has been due largely to private philanthropy in support of outstanding practitioners. Endowment has provided a substantial portion of such support and at present there are 30 endowed chairs, making it possible to attract and retain exceptional men and women of ability and commitment.

The integral role of research is perhaps best summarized in the following remarks by James B. Herrick, M.D., (who was the first to describe coronary heart disease and sickle cell anemia while at Rush) at the dedication of the Murdock Building at the Medical Center, in 1912:

... Unless the spirit of research is in a hospital, unless it pervades the various branches of the medical institution, the educational function of the hospital languishes and the atmosphere becomes stale; things fail to progress and the patients suffer... And yet no matter what view we may take, the central figure in the hospital is, and should be, the patient."

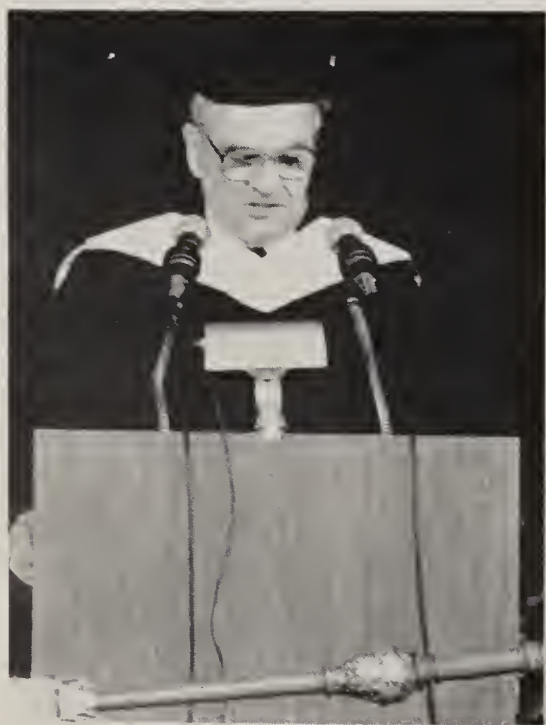
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**A Nobel Laureate
Discusses the Nature of
Scientific Research**

The Life of Service and the Life of Science

*Selections
from the Commencement Address*

By Baruch S. Blumberg, M.D., Ph.D.
Associate Director, Research
Institute for Cancer Research
Fox Chase Cancer Center



*Baruch S. Blumberg, M.D., Ph.D.,
associate director of clinical
research and senior member of The
Institute for Cancer Research in
Philadelphia, is a Nobel laureate
renowned for making the connec-*

*tion between an unknown blood
protein and the long-sought hepa-
titis B virus. This work, completed
before 1970, led to the first blood
screening tests for hepatitis B and
has prevented thousands of cases
of hepatitis by reducing the risk of
contaminated blood transfusions.*

*In the past decade, Dr. Blumberg
and his colleagues have documen-
ted evidence that chronic hepatitis
B infection is a major cause of
primary cancer of the liver. During
the course of these studies, Dr.
Blumberg and a colleague, Dr.
Irving Millman, devised a vaccine
to prevent hepatitis B. Researchers
believe that by preventing hepa-
titis B, the chain of events ending in
primary liver cancer will be broken
—which would make this the first
vaccine to prevent a human cancer.*

*Dr. Blumberg also holds aca-
demic positions as professor of
medicine and professor of human
genetics at the University of
Pennsylvania School of Medicine;
professor of anthropology at the
University of Pennsylvania; and
adjunct professor of anthropology
at Temple University. In addition,
he is an attending physician at
the Hospital of the University of
Pennsylvania, Pennsylvania Hospi-
tal, and Philadelphia's Veterans
Administration Hospital, and a re-
search collaborator for Brookhaven
National Laboratories.*

*Dr. Blumberg received an M.D.
from Columbia University in 1951,
and a Ph.D. in biochemistry from
Balliol College of Oxford University
in 1957. His numerous awards
include the 1976 Nobel Prize in
Medicine and the Modern Medi-
cine Distinguished Achievement
Award. At the 1983 Rush Univer-
sity commencement he was pre-
sented with the honorary degree
of Doctor of Humane Letters.*

I have elected today to talk about scientific process and how it may impinge on the practice of the health sciences. This may sound rather heavy on what is essentially a festive occasion. However, as Mark Twain is reported to have said about Wagner's music, "It's not as bad as it sounds." I can assure you that there will be a small amount of philosophy and a larger proportion of story telling.

Prevention of Disease/Health Maintenance and Improvement

The overall goal of the health professions is to cure disease and/or alleviate its symptoms. There is also an imperative to prevent disease but, traditionally and unfortunately, American trained physicians often see this as a secondary goal. Public health, epidemiology, and preventive medicine are usually not as much emphasized as the therapeutic specialties. Despite this, it is fair to say that prevention has saved many lives and abolished more disease and suffering than can ever be accomplished by individual therapies.

Other areas which are emerging are the maintenance of health, which should be different than simple disease detection and health improvement. Tens of millions of Americans and others are actually interested not only in health maintenance but in health improvement to make themselves more fit and physically skilled. These are traditionally not areas for physician concern, since our basic training as physicians is disease oriented. This is probably just as well since, despite all efforts at disease prevention and health improvement, many people do eventually become ill and physicians are the ones best trained to deal with this.



"Without research all the good care in the world will not greatly advance our knowledge of improved treatment and cure."

Nature of the Scientific Process

It is interesting to contrast the scientific and mythical explanations of nature. Both have as an objective the creation of a story which can explain the phenomena observed in nature and in common experience. For example, thunder and lightning can be explained in scientific terms as the result of electrical discharges between clouds and earth, or, in mythical terms, as the result of interaction between gods in their mountain homes. Both are satisfactory explanations for different purposes. However, the scientific hypothesis is established in order to be subjected to testing—that is, it can be replaced by a better hypothesis enlarged by new information. The mythical explanation is established to be accepted—that is, it is not only the best of all possible worlds, it is the only possible world.

A hypothesis should be stated in an unequivocal manner and the study designed to produce data capable of rejecting it. If the hypothesis is not rejected, then additional studies are designed in further attempts at rejection. If, after a sufficient number of attempts, the hypothesis is not rejected, the hypothesis can be tentatively accepted as if it had some properties of truth, with the realization that it could be rejected by additional data. Therefore, it may not be possible to say that a hypothesis has been "proven" beyond any doubt, but that it is more likely to be correct than not, and action can be taken as if it were true. It is an interesting paradox that science is often viewed as a series of established facts, whereas it may be more correctly understood as an integrated collection of non-rejected hypotheses.

This process of hypothesis testing has a very open-ended character. Each time a hypothesis is tested a body of data is collected which in turn generates more hypotheses. When these questions are tested and answered they generate even more hypotheses and these, in turn, generate more questions which require additional answers, *ad infinitum*.

Since additional data are produced by each testing and these data can lead to additional hypotheses, the process appears to pose more questions than it disposes. Unfortunately, this consequence is different from the expectations that some people have of science. This has been well expressed by Robert Pirsig in *Zen and the Art of Motorcycle Maintenance*, a book that was popular in the early 1970s. The narrator's original concern came when he realized that "as he was testing hypothesis number one by experimental method, a flood of other hypotheses would come to mind, and as he was testing these some more came to mind until it became painfully evident that as he continued testing hypotheses and eliminating them or confirming them, their number did not decrease. It actually increased as he went along." That is, he never could generate "total knowledge" of a subject. His distress, incidentally, led to his questioning of scientific method, a mental break, and, in due course, to a motorcycle journey with his son in quest of further knowledge of himself.

Australia Antigen and Hepatitis

I would like to illustrate, with an example from our own experience, how this process of repeated hypothesis testing can lead very often, through apparently circuitous

paths, to interesting and useful scientific results.

One of the most important questions in medicine is why some people become ill and others remain healthy when exposed to what appears to be the same disease hazard. Clearly, some of this is a consequence of chemical and immunological differences between people. One way to approach this problem is to increase our understanding of human variation. In 1956, we began to study variation in the proteins found in human serum and soon found that there were differences from person to person in specific proteins that were under hereditary control. This resulted in an extensive and interesting series of studies in populations from different parts of the world (i.e. Britons, Basques, Africans, Indians, Eskimos, and others) to see if there were serological variation in populations living under different environmental conditions, and this proved to be the case. We then made the hypothesis that if some of these serum protein variants were antigenic (that is, capable of raising an immune response in a human injected with the protein) transfused patients might develop detectable antibodies in their serum against variants which they had not inherited.

To test this, we collected serum from patients who had received many transfusions and tested it against serum from normal people who might have this postulated antigenic variation. Using this technique we found an antibody in some transfused patients that identified a complex system of inherited lipoproteins (i.e. proteins that contain fat) which had not been previously known. This was very gratifying since it supported our

"The scientific hypothesis is established in order to be subjected to testing... it can be replaced by a better hypothesis enlarged by new information."

hypothesis that new human biological variation could be found by the use of serum from transfused patients. We continued to test the hypothesis further by using sera from additional transfused patients to test against sera obtained from other populations. Since we were looking for unknown variations and the gene frequencies for most human variations vary greatly from population to population, we included in the serum panel against which the transfused sera were to be tested not only local populations but also those from Africa, Asia, Australia and elsewhere.

During the course of this ongoing research a reaction different from those seen before was observed. This reaction was between the serum for an Australian aborigine and that of a frequently-transfused hemophilia patient from New York City. What was this new phenomenon? What was the character and significance of "Australia antigen" (abbreviated Au), as we termed the protein present in the aborigine?

In order to find out, it was necessary to formulate a series of testable hypotheses; additional observations were required to do this. Australia antigen was stable in sera kept frozen, and we were able to test thousands of these taken from the large collection housed at the Division of Clinical Research of the Institute for Cancer Research. We learned that Au was very rare in U.S. populations but common (about 5-10 percent) in some African, Asian and Oceanic groups. We also learned that it was common in leukemia patients, most of whom had been transfused.

Based on this observation, we made a series of hypotheses including the hypothesis that there is an

inherited trait which makes people susceptible both to leukemia and to persistent carriage of the Australia antigen. To test this we generated a corollary hypothesis: namely, that people who have a high risk of developing leukemia should also have a high frequency of Au. Several such groups are known. Children with Down's syndrome (DS), mental retardation associated with an abnormality of the twenty-first chromosome, have a 20-fold or greater risk of developing leukemia. We tested groups of institutionalized DS patients and compared them to other mentally retarded children in the same institution. In all cases the frequency of Au was high in the DS patients (30 percent) and much lower in the controls.

This result was gratifying. It not only fulfilled the prediction from the hypothesis, but allowed us to observe a group of individuals closer to home than Australian aborigines and other populations in whom a high frequency of Au was found. We learned that the presence or absence of Au appeared to be a persistent trait. If Au was present at first testing, then it was likely to be present at all subsequent tests. Similarly, if Au was absent on first testing, then it was absent later.

Early in 1966 we found an exception. One of our patients who previously had not had Au did have it on a subsequent testing. He was admitted to our Clinical Research Unit at Jeanes Hospital (which adjoins the Institute for Cancer Research) for observation and evaluation. What appeared to be a "new" protein had appeared in his serum, and, since most serum proteins are manufactured in the liver, we performed a series of "liver function" tests. These showed that, between

the testing in which Au was not found in his blood and the "positive" test, he had developed a form of chronic hepatitis without apparent symptoms, which could be detected only by measurement of the changes in his blood.

This observation, then, generated the hypothesis that Au was associated with "viral hepatitis." For many years this clinical syndrome was assumed to be of viral etiology, but the virus itself had not been identified. We tested the hypothesis by requesting from our clinical colleagues specimens of blood from patients with the clinical diagnosis of hepatitis. We soon established that there was a much higher frequency of Au in the hepatitis patients, both acute and chronic, than in the controls.

A further series of studies soon confirmed that we had identified a protein on the surface of the hepatitis virus. This in due course allowed the development of methods for the detection of this hepatitis virus, our invention of a vaccine which protects against infection with the virus, and a variety of important therapeutic and practical applications.

The Myth of Daedalus

A view of the scientific process is that every time a problem is solved it generates another problem and that the solution of the second problem leads to others in a continuous process. I would like now to recount parts of the Greek myth of Daedalus, who can be taken as a model for the contemporary scientist as a problem solver and problem creator.

Daedalus was a famous architect, builder, designer, and inventor of the classic world... employed at the court of King Minos. Daedalus was



known for his ability to make clever images of animals, and this skill was employed by Pasaphae, the Queen of Crete and wife of Minos, when she became hopelessly enamoured of a great white bull presented to her and her husband as a gift by the God Poseidon. To help solve this problem of the Queen's love, Daedalus designed and built a life-size, hollow, internally-upholstered cow. The Queen positioned herself in the model, which was placed in a seductive position in the pasture and, in due course, was impregnated by the great white bull. Hence, her problem, her love for the bull, was solved, but it created another, namely the offspring of this unfortunate union, the half-beast, half-human Minotaur. This awful animal terrorized the citizens of Crete; the noise it created was thunderous; when it stamped its feet the earth shook, and it was a nuisance and danger in other ways as well.

Daedalus, the problem solver, then designed and built the labyrinth in which the man/beast could be secreted and kept away from others. This, too, generated problems, for the Minotaur required the sacrifice of young men and women. Each year, youths were sent from Athens to be offered up to his insatiable appetite. To this problem, another solution was developed by the irrepressible, abundant intellect of the hero-scientist, Daedalus. When Theseus was sent with the sacrificial youths, Daedalus told him and Ariadne, (daughter of Minos and Pasaphae, thus half-sister of the Minotaur) of the existence of a secret door by which they could enter the labyrinth to slay the Minotaur... Daedalus also gave Ariadne a magic spool of thread which would unwind and

teach them how to escape the labyrinth after they had slain the beast. They did this and fled Crete... Hence, another problem was solved but, as might be predicted, others developed.

Minos was very disturbed by the death of the stepson beast and imprisoned Daedalus and his son Icarus in the maze... This, too, had its solution. Daedalus invented wings, fashioned from feathers and wax. He and his son Icarus escaped their jailers but, in the ensuing flight, against paternal advice, Icarus flew too high. The heat of the sun melted the wax, the wings came away and Icarus fell to his death in the sea which now bears his name. The sun and its heat, the wings and their wax, the sea into which Icarus plummeted, his attitudes and his death all became part of the continuing cycle of questions and answers, problems and solutions, which are inherent to creative and responsible science, and to human questing.

What are some of the consequences of this view of the scientific process of obtaining knowledge? First, it implies that, since new questions on a topic are always being asked, it will never be possible to know everything about anything, much less to know everything about everything. Or, to put it in the context of our own experience as health workers, we are always making decisions with incomplete knowledge. One of the major consequences of your long training has been to make you aware of this and to train you to cope with this method of operation.

There is a consolation which can be drawn from the history of science and medicine. Although natural phenomena related to disease may be very complex, it is

often necessary to know just a portion of the story to effect prevention and treatment. There are many examples of this. In the 18th century the British epidemiologist Snow knew nothing of the cholera vibrio or, in fact, of the germ theory of disease, but his research taught him to remove the handle from the pump which supplied contaminated water. This simple act aborted an epidemic of cholera in his section of London...

Research is essential to the advancement of our field. Without it, all the good care in the world will not greatly advance our knowledge of improved treatment and cure. As health care workers, you will have to evaluate research since you will be responsible to your patients for making judgments for them.

You are today starting on an exciting new career with many potential rewards and challenges. Our very best wishes go with you. ☺

Multiple Sclerosis Center Seeking Answers for "Short-Circuited" Nerve Impulses

By Janis Long Harris

Looking at Diane, a slight woman with dark eyes and a youthful face, it's hard to believe she's a mother in her mid-30s. Even more difficult to fathom is the fact that she has multiple sclerosis. If she weren't sitting in a bed at Presbyterian-St. Luke's Hospital, hooked up to an IV, one might not suspect that she suffers from anything more serious than a mild case of fatigue. Seven days earlier, however, it was a different story.

"When I was admitted last week," she recalls, "I couldn't even walk. They had to bring me in here in a wheelchair."

Diane, who was diagnosed as having multiple sclerosis (MS) in the fall of 1982, tends to fluctuate between periods of exacerbation and remission. During her "good" periods, her symptoms are hardly noticeable.

"When I'm not having problems, I lead a pretty normal life," she says. "I get up at six, do the wash, take my daughter to school, go to the store, do housework, and cook dinner. I'm a room mother at my daughter's school, belong to the PTA, things like that."

That "normal life" is quickly disrupted, however, when Diane's disease flares up, as it did two months before she was hospitalized. Her vision blurred, her balance was off, and she began to stagger when she walked.

"I was so weak," she says, "I didn't have the strength to push the vacuum cleaner back and forth."

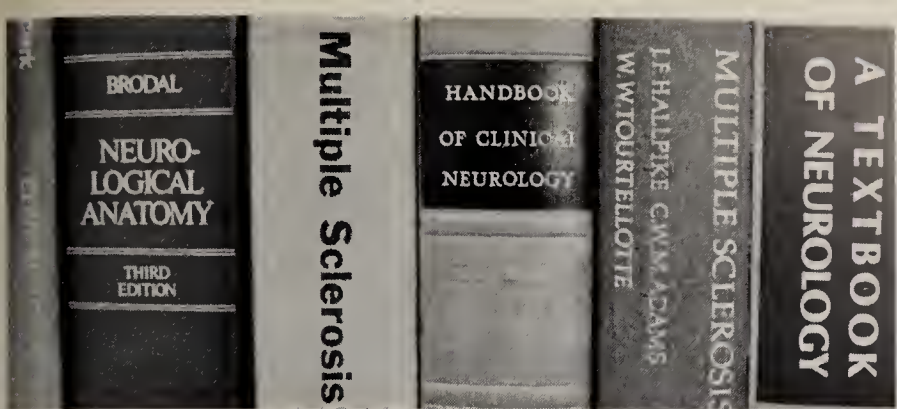
Four days after Diane was admitted to Presbyterian-St. Luke's, she was still suffering from mild fatigue and muscle weakness, especially by mid-afternoon. By day eight, however, after intravenous treatment with a drug called ACTH, she woke up in the morning exclaim-

ing, "I feel like superwoman today; I can't believe I'm the same person who came in here!"

Although ACTH appears to have been effective in reducing Diane's symptoms, it is not a cure for MS. There is no known cure. Also unknown is the precise cause, although MS is believed to be an autoimmune disease in which the immune system attacks myelin, an insulating coating surrounding nerve fibers. When myelin is stripped off nerves located in multiple sites throughout the central nervous system, nerve impulses are "short-circuited," causing such symptoms as muscle weakness, impaired vision, numbness and a "pins and needles" sensation in various parts of the body. This demyelinating process, its effects on nerve impulses, and the symptoms resulting from it, are the focus of research at Rush-Presbyterian-St. Luke's Medical Center (RPSLMC).

"We are not looking at the primary cause of multiple sclerosis," explains Floyd A. Davis, M.D., the Robert C. Borwell professor of neurology and acting director of the RPSLMC Multiple Sclerosis Center. "We are looking at what happens to tissue once a person already has MS. We want to know how we can intercept the disease and make MS patients function better."

Dr. Davis first became interested in symptomatic treatment of MS as a young resident in the early 60s. At that time, a common diagnostic test for MS was the hot bath test. This test was based on the observation that in many MS patients inducing a fever will dramatically and temporarily worsen symptoms. Dr. Davis was asked to perform a hot bath test, and, to his horror, the patient became totally paralyzed in



the legs and blind in one eye.

"When this happened I initially became very, very upset," recalls Dr. Davis, "because I hadn't expected this severe a reaction—although it did reverse immediately. When I saw this, it dawned on me that temperature was doing something to nerve fibers and it seemed worthwhile to find out what was going on."

As a result, in 1963, he began a series of studies on the effects of temperature on nerve fiber. In several years he was able to show that heating injured and demyelinated nerve blocked conduction, while cooling it restored conduction.

"What got me excited was not that you could make MS patients worse by giving them a hot bath test, but that you could make them better by cooling them," he says.

Not all MS patients are sensitive to temperature, but those who are (about 60 percent), can be affected dramatically by a change of a few

degrees one way or the other. Diane is one of those patients.

"If I take a hot bath," says Diane, "I'm so weak I can't get up out of the tub—my husband has to come pull me out. And just going out into the heat in the summer will make me so weak and dizzy that I feel like I'm going to faint."

"To understand the heat-sensitivity phenomenon, it's necessary to understand how a nerve impulse is produced and conducted," says Dr. Davis. "There are two phases of a nerve impulse or action potential." In the first stage, Dr. Davis explains, special pathways in the membrane of a nerve cell spring open, allowing sodium ions to rush in. This changes the voltage in the cell and produces an impulse. In the second phase, the sodium pathways clamp shut; simultaneously another set of pathways springs open, allowing potassium to flow out. Potassium tends to counter the effect of sodium, thereby shutting down the

impulse. The longer the sodium channels are allowed to remain open, the longer the duration of the action potential, and the stronger the impulse. Theoretically, increasing the duration of sodium flow should strengthen nerve impulses enough to restore conduction through areas not properly insulated by myelin.

"Once we considered the effect of temperature on normal nerves," Dr. Davis notes, "it was not very difficult to figure out what was happening when demyelinated nerves, such as those in multiple sclerosis, are heated. We determined that the blocked conduction was related to changes in the duration of the nerve impulse. Heating the nerve shortened the duration of the action potential (nerve impulse), while cooling the nerve increased it."

In the early 70s, Dr. Davis teamed up with physiologist and biophysicist Charles Schaaf, Ph.D., professor of physiology and neurological sciences and director of the graduate division of physiology, Rush University, in an attempt to discover which pharmacologic agents might produce effects similar to that of cooling nerve fibers. Their search for an answer to this question led to an important series of animal studies.

"In the first phase of animal studies, we wanted to learn more about channels across nerve cell membranes, what sorts of drugs acted on them, and what the effects of these drugs are," explains Dr. Schaaf.

"The second phase was to create lesions in animals similar to those



Floyd A. Davis, M.D., the Robert C. Borwell professor of neurology and acting director of the Medical Center's Multiple Sclerosis Center.

"We are not looking at the primary cause of multiple sclerosis. We are looking at what happens to tissue once a person already has MS."

Floyd A. Davis, M.D.

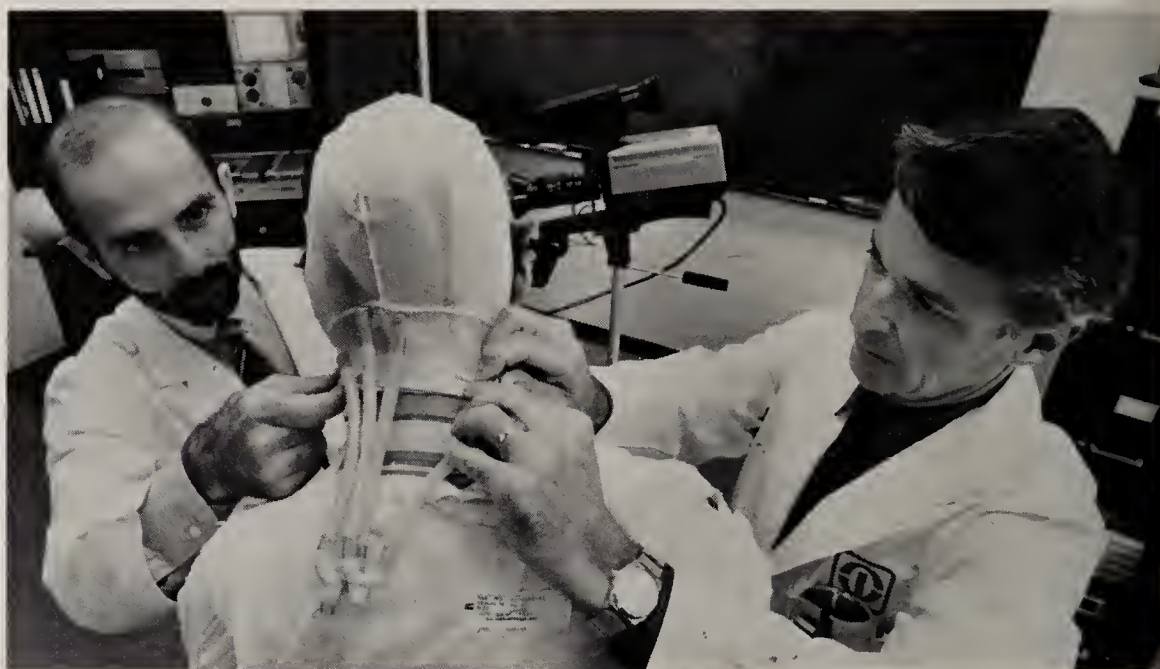
Dusan Stefoski, M.D., (left) and Floyd A. Davis, M.D., fit patient with cooling garment designed by NASA for astronauts and on loan to Medical Center. It is used to screen patients for temperature sensitivity.

found in humans with MS and then to test the ability of various drugs to restore conduction."

In 1974, Dr. Schauf and Dr. Davis published a paper predicting two kinds of drugs which might restore conduction in blocked nerve fibers: those which block the shut-down of sodium channels and those which block the opening of potassium channels. Either, they hypothesized, would have the effect of increasing the duration of an action potential, thereby strengthening a nerve impulse enough to restore conduction.

In pursuit of this hypothesis, they tested a number of drugs in animals. By 1980, the RPSLMC investigators had identified a compound which restored conduction in experimental settings: 4-aminopyridine, which blocks the opening of potassium channels in nerve cells and increases the duration of action potentials. After it was shown that 4-aminopyridine restores conduction in demyelinated nerves *in vitro* they applied to the FDA for approval to test it in humans. That approval came in the spring of 1983, and a clinical study was begun shortly thereafter with the support of the National Multiple Sclerosis Society.

According to Dusan Stefoski, M.D., assistant professor of neurological sciences and principal clinical coordinator for the project, the drug is now being tested in 26 to 28 patients. The three-year study began in summer, 1983. Subjects included in the study are males who are currently in a stable phase of the disease. Women have been ex-



cluded because the effects of the drug on the reproductive system are not yet known.

Thus far, Rush-Presbyterian-St. Luke's is the only medical center in the country to receive approval from the FDA to conduct clinical trials of 4-aminopyridine.

"This may or may not be a clinically useful drug," says Dr. Stefoski. "But we believe we're on the right track."

The 4-aminopyridine study follows on the heels of another clinical study in which ACTH, a drug currently used to treat MS, was "spiked" with other agents. It has been assumed that ACTH is of benefit to some MS patients due to its anti-inflammatory properties.

"But," says Dr. Stefoski, "ACTH has many effects, so we spiked it with other medications which increase one or the other of these effects to see which might have the most benefit in MS."

Among the agents used in conjunction with ACTH were mannitol, alkalizing agents, glucocorticoids, mineralocorticoids, androgens, and sodium. Each combination was ad-

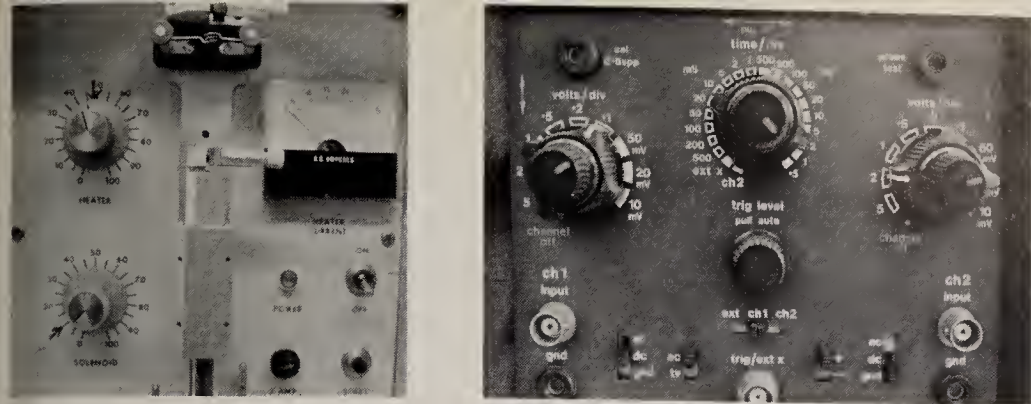
ministered to groups of from seven to nine patients, who were compared to each other, as well as to placebo groups.

"At the conclusion of this study," says Dr. Stefoski, "we found that some of these agents, when given intravenously over a short period of time, enhanced the effectiveness of ACTH in reducing symptoms in MS patients."

None of these treatments is a "cure" for multiple sclerosis, but Dr. Stefoski believes that clinical studies of potential symptomatic therapies are an important part of the overall MS research picture.

"The cause of MS may not be found for some time," he says, "but, even if it is, all those people already suffering from the disease now may not benefit from the discovery. Once the central nervous system is damaged, it can't fully repair itself again."

"More than 250,000 people in the United States have MS with varying degrees of symptoms. In many of these people, these symptoms have a tendency to worsen. If we can come up with a treatment which



will offer some alleviation of those symptoms—improve eyesight, leg strength, balance, bladder function—we will have achieved a lot.”

In addition to their search for therapies which would relieve the symptoms of multiple sclerosis, researchers at the Multiple Sclerosis Center are seeking to understand one of the great mysteries about the disease: why is it that some patients seem to recover spontaneously after an initial attack while others recover less readily?

Kenneth Smith, Ph.D., assistant professor of physiology, who works in Dr. Schauf's laboratory, is pursuing clues to this mystery in research supported by the National Multiple Sclerosis Society. Dr. Smith recently came to Rush from the National Institute of Neurology in London, England, where he was part of a group of investigators who performed an important series of experiments on artificially-demyelinated nerves.

“To understand the significance of the results of these experiments, it's helpful to picture a normal nerve

fiber as a string of sausage,” says Dr. Smith. “The sausages represent areas of myelinated nerve, while the gaps represent areas called nodes of Ranvier. The nodes are the regions where the nerve impulses arise; this is because in normal myelinated nerve the sodium channels are concentrated only at the nodes. The influx of sodium through the sodium channels at each of the nodes in turn recharges the impulse to insure that it reaches the far end of the nerve fiber safely.”

When Dr. Smith and his co-workers demyelinated nerve fibers experimentally, they found that conduction in those fibers was blocked—a predictable result. An unexpected result, however, was the appearance of new sodium channels along the length of the fibers several days after demyelination. Conduction was restored.

This fascinating finding sparked a new hypothesis: perhaps the spontaneous recovery of some MS patients can be explained by sodium channel spread in demyelin-

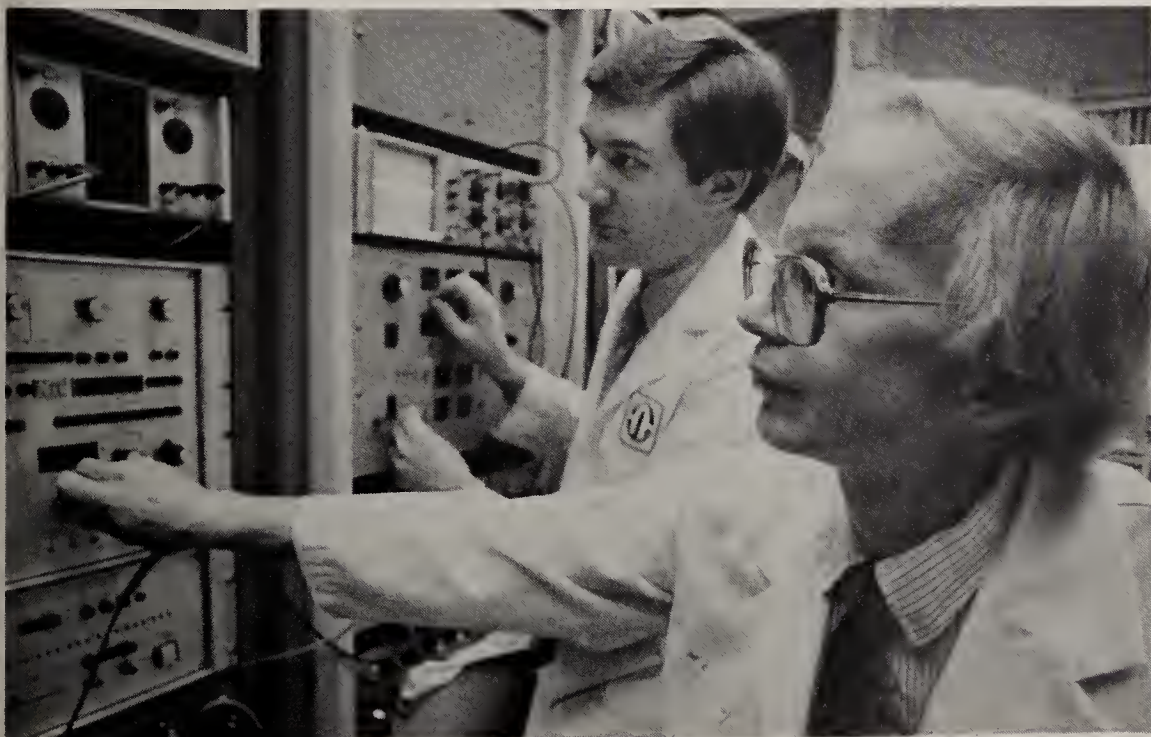
ated nerves. If so, further questions arise: Why does this happen in some patients and not in others? What can be done to initiate sodium channel spread? Perhaps the answers to those questions are related to another hypothesis which centers on a group of cells called glial cells. There are two kinds of glial cells in the central nervous system: oligodendrocytes and astrocytes. Oligodendrocytes manufacture the myelin surrounding nerves by wrapping sheet-like structures around them. Astrocytes appear to have a role in supporting the needs of the nerve fibers, although their exact function is not yet known. What is known is that they absorb potassium ions, preventing them from accumulating and blocking conduction.

“We suspect that astrocytes may be beneficial to the restoration of conduction following demyelination,” says Dr. Smith.

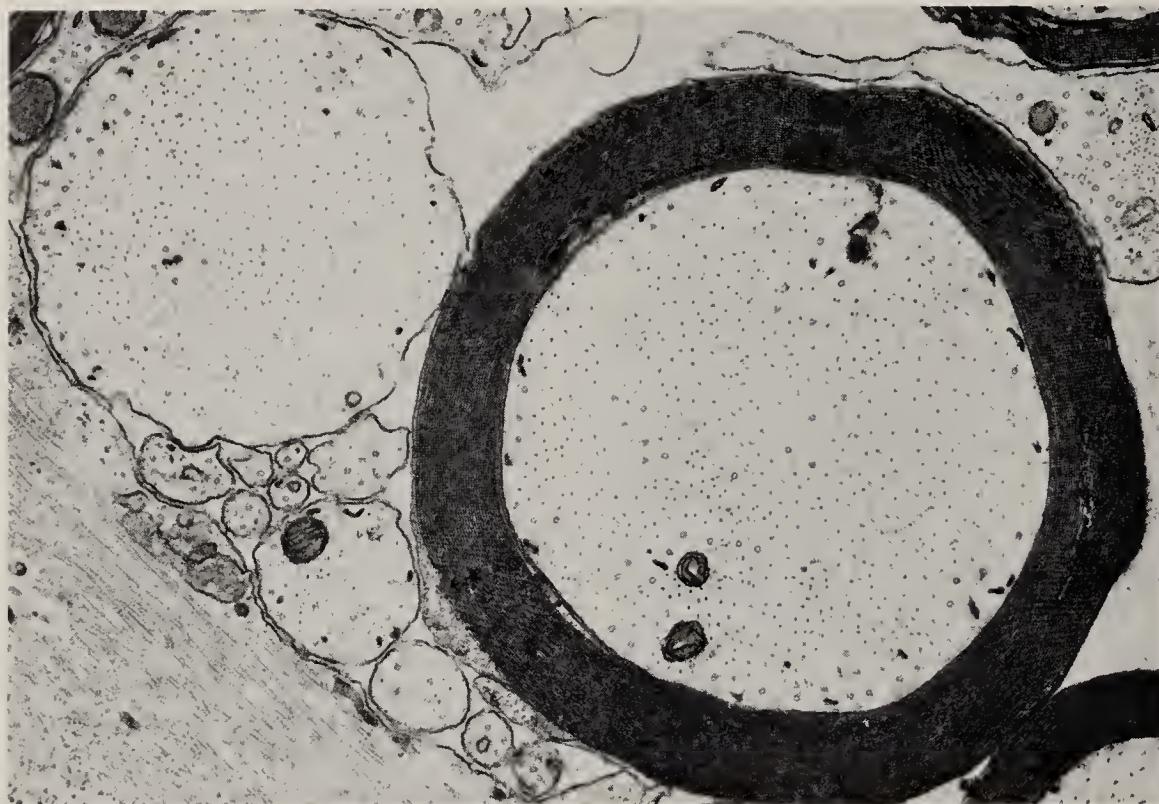
When MS attacks a particular site in the nervous system, oligodendrocytes are killed and myelin is destroyed. The space that used to be filled by oligodendrocytes and myelin tends to be taken up by astrocytes, which envelope the demyelinated fibers. This is not always the case, however.

“In MS, some nerve fibers are enveloped by astrocytes, while others are just bathed in extracellular fluid,” explains Dr. Smith. “It could be hypothesized that an important variable in whether or not a fiber will recover its conduction ability is the degree of astrocyte proliferation.

“No one has studied the role of astrocytes in symptom production.



Kenneth Smith, Ph.D., (left) and Charles Schaaf, Ph.D., collect data on a computer in their laboratory.



Cross section of normal and demyelinated nerve fiber. Normal, larger fiber is surrounded by myelin sheath (dark ring), while smaller, demyelinated fiber has lost myelin sheath.

They may do nothing at all, or they may be very important, and we need to know which of those statements is true."

Until recently, such an investigation was not possible because the only nerve fibers that were available for study had lesions in which astrocytes were numerous; there were no lesions where the fibers were bathed solely in extracellular fluid.

That obstacle was overcome, however, when Dr. Smith and Dr. W. F. Blakemore, of Cambridge University, developed a new type of lesion. "We are now able to produce large lesions without astrocytes," says Dr. Smith. "It remains to be determined whether or not the nerve fibers involved will be able to conduct."

Rush investigators are now gearing up for another study in which they will examine the effects of inflammation on nerve function. Although inflammation is often present in MS, it has been assumed in the past that most MS symptoms are related to the demyelination process.

"If we are able to connect something abnormal about inflammation which is deleterious to nerve impulse conduction," says Dr. Davis, "there's the potential for blocking it (inflammation) either with an agent we already have or one which is being worked on experimentally."

"So you see, in everything we do here, even if it looks really basic, we've got something in the back of our minds about how it might feed into the patient."

Ⓢ

The Multiple Sclerosis Center



Cartina Biffle, a Multiple Sclerosis Center patient now in remission, is the mother of three, a college student and enjoys tennis and running. Center research is probing for answers to why some patients seem to recover after initial attack.

The Multiple Sclerosis Center at Rush-Presbyterian-St. Luke's is a multidisciplinary patient care and research center. It serves approximately 2,300 patients, and that number is growing. The 250 new patients accepted into the program last year represented a 20 percent increase over the previous year. The Center has an international reputation, as evidenced by the fact that its patients come from throughout the United States, as well as from several foreign countries.

The Center is staffed by two physicians, two psychologists, two physiologists and three research technicians. The physicians, Floyd A. Davis, M.D., the Robert C. Borwell professor of neurology and acting director of the Center, and Dusan Stefoski, M.D., assistant professor of neurology, diagnose and treat patients and oversee their total program of care. That program may include counseling with psychologists Marcia Pavlou, Ph.D., assistant professor of psychology and social sciences and associate director of the Center, and James Stewart, M.S., coordinator of psychological programs. Because living with multiple sclerosis can require significant adjustments, for the patient *and* his/her family, counseling services are offered to both. Physiologists Charles Schauf, Ph.D., professor of physiology and neurology and director of the graduate division of physiology, and Kenneth Smith, Ph.D., assistant professor of physiology, are conducting research projects aimed at understanding the mechanisms of nerve impulse conduction and what happens to conduction when nerves are attacked by MS. Drs. Davis, Stefoski, and Pavlou conduct the clinically-oriented research studies.

The Multiple Sclerosis Center currently has 13 ongoing research projects. These projects are supported by such groups as the Seabury Foundation, the National Multiple Sclerosis Society, the Henry Foundation, the Kroc Foundation, the John Ruan MS/Charity, and the National Institutes of Health, as well as by numerous individuals.

The Center has existed in some form since 1970, although it was not officially established until 1979. According to Dr. Davis, it was the first center of its kind in the country. "We were the first institution to bring together a multidisciplinary staff in one location to treat MS patients," he says. "There are other centers now, but we are pretty unique in the midwest. It makes a difference when patients can receive physical and emotional care in one location—especially when family members receive emotional support there too. We deal with the whole family unit."

Ⓜ

Putting Health on Corporate Agendas

James A. Campbell, M.D.

I would like to invite you to look ahead and to think along with me about where we as a society are going in health care, to think about whether we really want to go there, and what we might do to give a better configuration to the future. I can think of no better place to have such thoughts than here at the Union League Club of Chicago. For generations, you have provided a forum for serious analysis of the issues facing our city and nation. From such deliberations have come the understandings necessary for imaginative and practical solutions to problems of broad consequence.

Changes in the economy and in demography, particularly urbanization and aging, must be reckoned with by health care planners. At this point, I should make clear exactly who I mean when we talk about health care planners. I am talking about you as leaders. Health issues should be on the agendas of every civic organization and every business in the metropolitan area. Social policy and direction must come from leadership groups within the private sector. Health policy that is formed as a result of careful internal study by private sector and voluntary sector organizations will be much more humane, comprehensive and cost-effective than that devised and formulated by government.

Currently the most visible issues are those relating to costs. Health care accounted for 4.5 percent of the GNP in 1950, and 9.8 percent in 1982. Is this too much? Not enough? Of course, these are issues *you* should be thinking about, but in the context of providing direction to us health professionals as to what you want and for whom you want it and in what quantities. At the same time that costs con-

tinue to rise, the federal government, one of our largest purchasers of health care, is trying to cut back spending forcibly and to reduce or withdraw the federal presence in certain programs such as biomedical research, Medicare and Medicaid. Is this good or bad for all our people?

Ultimately, all such discussions come back to how you and the other members of society want to allocate your dollars for health. Where do you want to spend them? On whom? Whom do we ignore? Whom do we serve? To what extent? I don't need to tell this group that *dollars are really the ration stamps for health care*; the issues then become who will do the rationing and how the priorities are decided. Society will have to tell the health establishment which problems to address, which people to serve, how much it is willing to pay.

Scientific and technological progress seem to me essential. Implementing and applying that progress is another part of your debate. The questions of large scale expenditures, social equity and ethical responsibility arise out of implementation and application of new knowledge, as well as its discovery. These issues are political in the very best and largest sense of our democracy.

Let me call your attention to renal dialysis as one example. The decision to provide access to dialysis through federal support for patients with certain end stage renal diseases is, was, and has been a political, not a medical decision. The more recent decision to reduce the scale of government payments for those services is also political, not medical. Science and the professions are the servants of the public

Remarks delivered on the occasion of the presentation by The Union League Club of Chicago of its Distinguished Public Service Award to Rush-Presbyterian-St. Luke's Medical Center. The Award Dinner also honored the 100th anniversary of the founding of Presbyterian Hospital.



From left, Terence F. MacCarthy, president, Union League Club of Chicago; Harold Byron Smith, Jr., chairman, Medical Center Board of Trustees; Don S. Harnack, chairman, Public Affairs Committee, Union League Club, and James A. Campbell, M.D., president, Medical Center, with Distinguished Public Service Award presented to Medical Center by club.

At the present moment, we at the Medical Center take great pride in the progress which appears to be under way by the State of Illinois in introducing a prepaid health plan for the medically indigent that offers the possibility of saving perhaps as much as \$130 million tax dollars every year.

Planning has worked for Rush-Presbyterian-St. Luke's and it will work for our community too. It is a function of leadership. We ask respectfully that you as leaders put health on your agendas. The "agenda for health" for Chicagoland is broad and basic. It challenges us to face issues of consolidation, coordination, cost containment and competition in order to provide the standards of care we know are attainable.

We at Rush-Presbyterian-St. Luke's believe that the neighborhood community hospital—perhaps one you call your own—is of vital importance to the health of this area, but the isolation of those institutions from one another and particularly their isolation from the academic health institutions must be remedied not only to contain costs but also to improve services and invite access and continuity of care and also to replenish and renew manpower.

To create health care systems in this vast metropolitan area will be difficult. Where competition has a place we should not fear to give it a place. As Americans, we have built

and look to the larger society for both resources and direction.

These issues and many more like them belong on the agendas of our civic and our corporate leadership and organizations such as you represent. They affect us all and require involvement and participation far beyond "common politics" because we are talking about the health of the "body politic" itself.

Now I have disavowed expertise on social and political policy on the part of the health establishment. But, repeatedly, we at Rush-Presbyterian-St. Luke's Medical Center have looked closely at the forces that affect the health of the people of Chicago and Illinois. We are concerned.

If one looks at the last quarter of a century of Rush-Presbyterian-St. Luke's, we see that period opened as civic leaders, some of those here

tonight, brought together two major institutions—St. Luke's and Presbyterian—to form a new institution to meet greater responsibilities. And thanks to the foresight of those civic leaders, other events transpired, other mergers, acquisitions and new corporations were formed, and new systems developed. The new institution is in the forefront as one of the nation's major academic health centers today.

Through the Trustees, the medical staff and the faculties, its scientists and its professionals, the Medical Center accelerated year by year its involvement in health care planning for the entire metropolitan area. In addition to giving superb care, it undertook experiments and demonstrations addressed to cost containment, administrative and managerial reforms and educational and scientific improvements.

some very special values into our personal health care institutions and they must be safeguarded. The stimulus of competition may be most effective if it offers choices among systems of health care in our region rather than merely among separate unrelated institutions.

Cost containment are today's important words. Cost containment is a critical problem for both public and private dollars. But cost is not the only health care issue. The real cost of illness lies not only in our personal, insurance and governmental program expenditures. The real costs lie in work loss and personal impairment and social disruption. We must ask, however, that costs be justifiable, rational, and that they be borne equitably. We must stabilize and perhaps even define a basic standard of care without putting a lid on our capacity to do better.

Health is a matter for the long view. Efficiencies must be demanded of institutions and individuals serving that goal and inefficiencies surely do not serve to promote it. But we must guard against short-sighted measures that intrude on personal and professional relationships, constrict the development of talented young people, and discourage the search for new knowledge and the investment in promising technology. For our city, and region, let us take a full view as well as a long one. Leadership such as is in this room can meet the health challenge.

On the 75th anniversary of the Union League Club of Chicago—thirty years ago—a history of your organization was published under the title "Fight For a City." The spirit communicated by that phrase—fight for a city—has been evident at the Medical Center as our Trustees

have built a new institution on a great legacy, determined to stay in Chicago and to grow and to serve it.

At this gathering tonight, in this exhortation, I should like to summon up that Union League spirit again and invite each of you as leaders to "fight for our city" and put health on your agendas. Voices from the past remind us that: "The health of the people is really the foundation upon which all their happiness and all their powers as a state depend." In paying tribute to the past on this occasion, and I can't think of any more pleasant occasion on which to have a party than a birthday, let us take heed of our responsibility for the future. Or as Lord Buchan said "We can only pay our debt to the past by putting the future in debt to ourselves."

All this has led up to my opportunity to remind you of the remark by Will Rogers. You'll forget all the rest but remember what he said: "Even if you're on the right track, you'll get run over if you just sit there." ☛

Health Care In The 80s: Who Will Pay?

By Donald R. Oder

Acting President
Rush-Presbyterian-St. Luke's
Medical Center

A recent cover of *Newsweek* asks, "Who Will Pay?", in reference to the Social Security crisis. This is also an appropriate question to ask about health care in the 80s. Clearly, everyone is not going to have access to all of the medical care that is available when that care is needed. There are several reasons for this lack of access, but one major reason is the lack of ability to pay. Many such cases receive no publicity at all, but recently we saw an example in a potential liver transplant case. A *Chicago Tribune* article regarding a five-year-old Chicago boy needing a liver transplant noted that the transplant would not be performed until the \$150,000 needed to pay for the operation had been raised. This problem of having to refuse service to those unable to pay, in a life or death situation, is a barrier to many hospitals making these expensive services available to anyone. Several years ago kidney dialysis was a similar problem before the federal government began paying for the service through the Medicare program.

This example may be somewhat extreme but it does indicate that there is a limit to health care entitlement and that health care services may be denied for lack of payment. At this time we have almost no clarification of what health care is a right and what is a privilege, but there is a growing realization that unlimited health care for everyone is not an affordable goal.

In addition, we have not been able to measure the health care product so that it can be priced and delivered in grades of good, better and best. Although the quality of health care does not vary by source of payment, there is a wide variation in the amount paid for the same

services. The gap has widened in recent years and those paying the top dollar are becoming increasingly concerned.

The broad categories of payment alternatives for hospital services are welfare, a state controlled program, Medicare, Social Security for the aged and disabled and private insurance primarily through employers. Let's examine the current status of each.

The Cost of Social Obligation

In earlier years we undertook our social obligation to provide the basic necessities of life, food, shelter and clothing to our fellow citizens who were otherwise unable to obtain them on their own. We decided that all individuals had a right to an education at least through high school, and public schools were established to meet that obligation.

Health care has also been generally established as a right for all citizens, but the attempt to pay for today's advanced levels of care has become a financial problem for all levels of government and is completely beyond the reach of conventional charitable organizations. The first move by government is to squeeze the provider by buying the same services but paying less. This has now reached the point, however, where services paid for by government have to be limited and some previously eligible recipients are being dropped from the program.

Prior to Medicaid in 1965 the federal government had very little involvement in financing health care for the needy. Enacted as Title XIX of the Social Security Act, Medicaid provides payment to health care providers on behalf of the needy. Medicaid programs are de-

Excerpts from a speech delivered to Servicemaster managers, reprinted from ACTION with permission of Servicemaster Management Services.

signed and administered by the states, and the federal government shares the cost of the programs by matching state expenditures. The eligibility of recipients is determined by the states in accordance with federal regulations. Payments to hospitals and other providers are made by the states, giving them a great deal of discretion on the method of payment and reimbursement rates. States also determine the amount, duration, and scope of services offered beyond a certain federally required minimum. For instance, Illinois has about one million recipients in all of the various categories of medical assistance. The \$1.6 billion cost of medical care exceeds the cost of the welfare payments to the recipients for living expenses. About half of the \$1.6 billion paid for medical assistance goes to hospitals. This is a very important source of income for many hospitals in Illinois, particularly inner-city hospitals.

The hospital line item of the state budget in Illinois was \$819 million in fiscal 1981. The increase was held to 3 percent in 1982 up to \$843 million by an agreement with the hospitals to reduce billings to the state by \$106 million. The state continued to have financial problems in the 1983 budget and the hospitals agreed to a reduced budget down to \$797.5 million, 3 percent below 1981. Governor Thompson announced in January, 1983, that he will reduce the 1983 hospital budget by 4 percent, down to \$765 million as part of the attempt to bring state expenditures in line with lower than expected revenues. The hospitals are filing suit to enforce payment of the original \$797.5 million commitment that was previously provided for in special legislation.

Any company that sells goods and services to hospitals needs only to look at the prices it is charging hospitals for these goods and services to know that hospital costs are increasing. With the cost of hospital services increasing and payments from the state decreasing, some hospitals are getting into financial trouble.

Another social issue involves the individuals who will no longer be eligible for medical assistance and others who will not be covered for certain services. Who will provide health care services to those without any means of payment? Who will pay? There is no such thing as free service; any service provided has to be paid for by someone.

One of the budget savings implemented by the State of Illinois on February 1, 1983, was a payment limit of \$500 for the hospitalization of a general assistance recipient. This is about 25 percent of current payments that are already substantially below cost.

There is no reason to believe that the immediate future years will provide any relief to this trend of reduced funds for the medically needy. The social obligation that hospitals have undertaken in health care will become increasingly difficult to maintain as advances in technology continue to make health care more expensive.

The Controversy Over Medicare

The Medicare program that provides health care benefits for the aged and disabled should not be confused with the welfare programs. Medicare is a federal program financed through the Social Security system to provide health care services to people in their retirement years. It is a program that we all expect to be eligible for when

we retire, and we are all paying into it as part of our FICA taxes during our working years.

Medicare was enacted in 1965 as Title XVIII of the Social Security Act. Like the Social Security system in general, this program suffers from over commitment and under financing, but is nevertheless expected to be a health insurance system for the retired segment of the population.

Medicare is the most significant payment source for many hospitals. It was originally designed to pay hospitals on the basis of the reasonable cost of services provided for Medicare patients. There have been many changes in the cost formula through interpretation of what can be included in reasonable cost, and cost limits have been established for certain services.

The recent enactment of the Tax Equity and Fiscal Responsibility Act (TEFRA) established a maximum average payment per case for Medicare patients in each hospital. This payment system is to remain in effect until a new prospective payment system can be implemented. The differential between the payment for services provided to Medicare patients and charges to nongovernment patients continues to grow.

The prospective payment plan for hospitals that has been proposed by the federal department of Health and Human Services (HHS) would pay hospitals a fixed fee for every Medicare patient based on his medical diagnosis. Fees would be established for each of 467 diagnosis related groups (DRGs) combining similar ailments usually requiring about the same amount of hospital resources.

The DRG method of payment is a controversial system that is being

"With the cost of hospital services increasing and payments from the state decreasing, some hospitals are getting into financial trouble."

tested in New Jersey. A recent *Chicago Tribune* editorial says the concept may be hazardous to your health. Stanford economist, Alan Enthoven, sees problems with the system that controls hospital costs per case but fails to recognize that it is the doctor who orders the services. He also notes that costs within DRGs are highly variable.

According to George Ross Fisher, M.D., author of *The Hospital That Ate Chicago*, the DRGs spell disaster. When a hospital gets paid the same amount of money for simple cases as for complicated ones, it gets rid of the complicated ones. New Jersey's DRG system, in operation since 1980, illustrates the point. Complicated cases don't appear in New Jersey hospitals. They go to New York or Philadelphia.

Keeping Hospitals Solvent

What is usually referred to as health insurance is really sickness insurance—it pays the cost of being sick. The commercial insurance companies on behalf of their policy holders and self-insured business groups pay hospitals the prices for services as established by the individual hospital. It is this segment of the hospital business that keeps hospitals solvent. The hospitals that do not have a reasonable percentage of private insurance business are not likely to survive economically in the long term, since much of the unreimbursed cost of services to government sponsored patients are recovered by additional charges to the privately insured patient. It is estimated that this additional charge is about \$100 per day or 15 percent of the total charge of hospitals in the Chicago area.

The commercial insurance companies through their association, Health Insurance Association of

America (HIAA), have been lobbying for regulation of hospital rates through a state agency.

Blue Cross is a not-for-profit, tax-exempt organization that has characteristics similar to a commercial insurance company. Effective in 1983, the Blue Cross plan in Illinois converted to a mutual insurance company to eliminate the requirement to have premium rates approved by the Illinois Department of Insurance. This will not, however, change the contract with hospitals that limits payment to a maximum amount based on a cost formula.

Blue Cross believes that the lower rates paid for hospital services are justified because of their underwriting policies that provide insurance coverage to some individuals who would not otherwise be able to buy insurance at an affordable rate. Neither hospitals nor Blue Cross are satisfied that the contract that has been in effect for nearly 30 years continues to meet the needs of today. Alternative contracts are being jointly developed.

Business Concern for Moderating Costs

The rapid increase in the cost of health care has caused concern among the nation's corporate leaders. The Chamber of Commerce of the United States and the Business Roundtable have identified the cost of health care as one of the most important issues facing American Business in the 80s. For the foreseeable future, business will, in an organized fashion, act to influence health policy and to moderate the growth in health care costs and the resources invested in health care services.

Many local business coalitions have been formed to explore ways

to control better the cost of health insurance for their employees. The primary focus of the business coalitions has been on reducing hospital use by employees through elimination of unnecessary hospitalization and reducing the length of the average hospital stays.

Larger corporations are doing more health education and promotion of healthier lifestyles to reduce illness.

Alternative health delivery systems such as health maintenance organizations (HMOs) and multiple choice benefit options are being used to encourage cost conscious purchase of health care services.

Changes in the design of benefits to move away from full coverage, fee for service type plans to plans with deductibles and coinsurance is the fastest growing method for cost control by business.

There are, of course, a variety of approaches to health insurance plans, but The Mendocino Rebate Program, begun four years ago in Mendocino County, California, is a good example. The Plan appeals directly to employees' financial self interest. The \$500 deductible major medical plan offers a bonus for not using the plan. The money is deposited for each employee each year with the school system's credit union. The employee retains any balance not used.

Quaker Oats recently announced its health incentive plan with an initial \$300 deductible that is available to the employee in cash or other benefits if not used during the year.

There continues to be significant support as well as opposition at the federal level to limit the amount of employee tax-free health benefits. The purpose would be to make

employees more cost-conscious in choosing a health insurance plan. The proposal is opposed by organized labor and the health insurance industry.

The Hospital Industry's Dilemma

Every hospital is committed to a single standard of medical care and may not provide a different quality of service based on the source of payment. Hospitals must accept payments from the state and federal governments as payment in full for the services rendered to their program patients. The only current option for recovery of the unreimbursed cost of government programs is to include this cost in the price charged for services to private patients.

At one time, state rate review systems seemed like a solution to the problem of inequitable rates among payors. However, it became apparent that such a system would reduce the quality of hospital care to everyone on the basis of what the state elected to pay for welfare cases.

Another dilemma facing a hospital is whether or not to offer a service that would be made available only to those who are able to pay the price. It is usually easier to just not offer the service than face the potential bad publicity of withholding a service from a patient unable to pay. This will become more of a problem as more expensive technology makes certain services not affordable in government programs.

For instance, what should hospitals do with what is called "medical miracle" technology? A recent *Chicago Sun Times* article was entitled, "Medical Miracles Raise Some Hellish Questions." The article refers to artificial hearts, liver

transplants, test-tube babies and kidney dialysis in raising the question of the appropriate allocation of resources and on what basis scarce high-tech medicine will be distributed. Today, expensive advances such as these help fewer people and add fewer years to the human life span.

Certainly hospitals do not want to be charged with the responsibility of rationing health care, although a certain amount of rationing occurs when their funds are restricted. A more rational system is when the purchaser, whether government or private insurance, clearly defines what it wishes to buy.

Daniel Callahan, Director of the Hastings Center Institute of Society, Ethics and Life Sciences, comments on the doctors' role in allocating health resources: "The traditional ethics of medicine is that you do everything possible for the patient. Doctor's are not in the policy business of allocating medical research nationwide. We want doctors who are worried about us, who are our advocates."

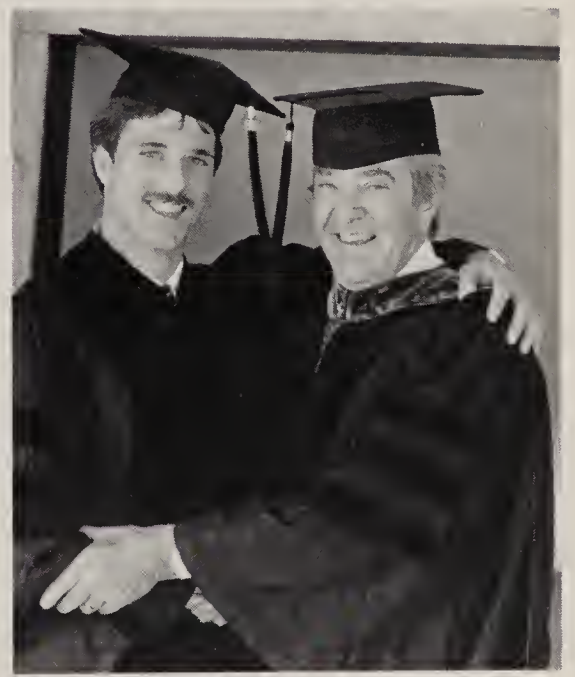
An Urgent Issue of Public Policy

Health care in the 80s: Who shall pay? The health care system seems to be moving more toward a multi-class system for allocation of health resources. Basic health care coverage will be identified for government plans and some private plans. Services will be available only from certain selected providers under some plans. More extensive coverage, including some of the high-tech medicine, will be available in supplemental insurance policies that may be purchased at the option and personal expense of the individual. This more restrictive coverage under the basic fee-for-service programs will encourage

more individuals to elect coverage in a health maintenance organization plan.

This scenario may go a long way toward solving the problem of financing health care, but the moral and ethical issues that this would create may be unmanageable. These moral and ethical issues involve the appropriate allocation of health resources and the bases on which these decisions are made. The determination of whether certain high-tech medicine is a right or a privilege should not be made by physicians or hospitals. The public policy issue of who shall live needs to be addressed now. ❧

COMMENCEMENT 1983



Commencement 1983

Rush University awarded 378 degrees at its 11th commencement exercises on June 11, 1983 in Chicago's Medinah Temple.

Roger E. Anderson, vice chairman of the Board of Trustees, and James A. Campbell, M.D., president of the Medical Center, conferred the degrees on the graduates. One hundred and twenty-eight graduates received the doctor of medicine degree; seven, the doctor of nursing science degree; two, the doctor of philosophy degree in immunology; one, the doctor of philosophy degree in physiology; 69, the master of science degree in nursing; seven, the master of science degree in clinical nutrition; eleven, the master of science degree in health systems management; three, the master of science in occupational therapy; seven, the master of science in speech/language pathology; five, the master of science in audiology; 128 a baccalaureate degree in nursing; and ten, a baccalaureate degree in medical technology.

THE AWARDS

ALPHA OMEGA ALPHA HONOR MEDICAL SOCIETY

Undergraduate membership is extended to medical students who give promise of becoming leaders in the field of medicine.

Students elected to membership in Alpha Omega Alpha, Zeta Chapter of Illinois, were:

*Lawrence Anthony Albani
Christine Maria Cherry
Karen Ann Griffin
Virginia Linabury Gronke
John Charles Houchins
*Eric William Jacobson

Steven Keith Kraker
Mark Allan Laughlin
Thomas Albert Mayer
*Anne Ritke McCall
Derek David Muehrcke
Albert John Musa
Richard Donald Rames
*Michael Warren Schwartz
*Erik Christian Stabell
*Michael Jerome Stuart
*Henry Dale Tazelaar
*Karen Beth Weinstein

**students installed as members in 1982*

SIGMA THETA TAU NATIONAL HONOR SOCIETY FOR NURSING— GAMMA PHI CHAPTER

Membership is extended to undergraduate and graduate nursing students who demonstrate outstanding academic achievement, leadership qualities, and commitment to the ideals and purpose of the profession.

Members in the Gamma Phi Chapter are:

UNDERGRADUATE NURSING

Denise Bleuher Angst
Margaret Jean Berendsen
Deborah Ruth Cook
Debra Ann Daly-Gawenda
Laura Lagorio Ellew

Lisa Ann Ferrill
Laura Leigh Ferris
Cynthia Lorraine Fischer
Julie Pollard Grant
Shaun Anne Hyndiuk
Eleftheria Terry Karapas
Theresa M. Larzelere-Artig
Beverly C. Leto
Lin Jean Morrison
Katherine A. Pakieser-Reed
Janice Louise Penner
Laura Ann Reynolds
Diane Willey Rodriguez
Nancy Marie Ronczy
Jennifer Huber Sakamoto
Karen Ann Soderberg
Gay Laray Streeter
Pamela R. Weiner
Jane Elyse Weinstein-Jacobson
Mary Beth Theresa Weirich
Margaret Sue Wood
Renee Louise Zubay

GRADUATE NURSING

Diane E. Brown
Melanie Susan Czech
Martha Ann Dickerson
Cheryl Diane Eggers
Jacqueline M. Evans
Karen Jean Ferguson
Doreen Marie Getz
Deborah R. Heintzelman
Virginia Strubbe Horth
Susan Mary Kotowski
Ruth S. Larson



Jean Theresa Lydon
 Deborah Jean Miller
 *Kathleen Kindelin Pender
 Kathleen Petruskas
 Janice Edna Post-White
 Caroline Mary Anne Pouliot
 Elaine Marie Sampson
 Patricia A. Vielbig-Covelli

**student installed as member in 1982*

HONORS AND AWARDS OF THE COMMENCEMENT INCLUDED:

THE NATHAN M. FREER PRIZE

To Michael Warren Schwartz voted by the faculty as outstanding senior medical student. This award was endowed in 1892.

THE HENRY M. LYMAN MEMORIAL PRIZE

To Bonnie T. Zima, the outstanding junior medical student as voted by the faculty. This award was endowed in 1908.

THE DAVID PECK PRIZE

To Angela Renee Perry, for the student who has made the greatest contribution to the Student National Medical Association.

THE LEMMON COMPANY STUDENT AWARD

To Christine Maria Cherry, for the graduating medical student who has excelled in the study of obstetrics and gynecology as demonstrated by excellence in scholarship and concern for patients.

THE SIR WILLIAM OSLER PATHOLOGY PRIZE

To Anne Ritke McCall and Henry Dale Tazelaar, medical students, for demonstrating outstanding achievement in diagnostic or experimental pathology.

THE UNDERGRADUATE CARDIOLOGY AWARD

To Mark David Wittry for the graduating student who has had the best performance in a cardiology elective course.

THE JOHN GILES PRIZE

To Thomas C. Neylan, for out-

standing undergraduate work in epidemiology and public health.

THE NEPHROLOGY AWARD FROM THE MUEHRCKE FAMILY FOUNDATION

To Erik Christian Stabell for outstanding achievement in the field of nephrology.

THE DEPARTMENT OF FAMILY PRACTICE AWARD

To Lisbeth Mary Lazon, for the graduating student who has demonstrated academic excellence in family medicine.

THE SANDOZ AWARD

To Virginia Linabury Gronke, for the graduating student who has demonstrated outstanding achievement in the field of psychiatry.

THE DAYTON BALLIS HUMANITIES FELLOWSHIP

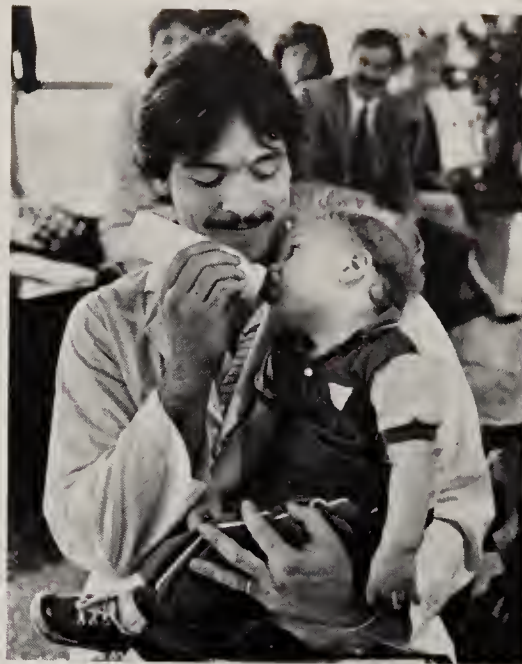
To Constantina Lampropoulos, a Rush Medical College student, for academic excellence in the humanities related to medicine.

THE UPJOHN ACHIEVEMENT AWARD

To Gary Steven Sudakoff, the senior medical student with the best research project.



Graduate College Appreciation Award went to Mark Lepper, M.D., (left) former dean.



THE AMERICAN MEDICAL WOMEN'S ASSOCIATION SCHOLARSHIP AND ACHIEVEMENT CITATION

To Alice Gutknecht Farley, Karen Ann Griffin, Virginia Linabury Gronke, Anne Ritke McCall, Ellen Beth Tabor, and Karen Beth Weinstein.

THE RUSH-PRESBYTERIAN-ST. LUKE'S NURSE ALUMNI ASSOCIATION AWARD

To Deborah Ruth Cook, for the outstanding nurse graduate.

THE COLLEGE OF NURSING DEAN'S AWARD TO AN UNDERGRADUATE STUDENT

To Denise Bleuher Angst for superior leadership in the undergraduate nursing program.

COLLEGE OF NURSING DEAN'S AWARD TO GRADUATE STUDENT

To Sharon May Fruh, for superior academic leadership in the graduate nursing program.

THE KELLOGG SCHOLARSHIP AWARD

To Kathleen Potempa, for superior academic achievement by a doctoral nursing student.



THE COLLEGE OF HEALTH SCIENCES DEAN'S AWARD TO AN UNDERGRADUATE STUDENT

To Dawn M. Smith, for outstanding academic performance by an undergraduate as chosen by the faculty.

THE COLLEGE OF HEALTH SCIENCES DEAN'S AWARD TO A GRADUATE STUDENT

To Illeane Schwartz, for outstanding performance by a graduate student as chosen by the faculty.

THE CLINICAL NUTRITION FACULTY AWARD

To Mary Dianne Klem, the graduate student who has demonstrated the greatest potential for contribution to the field of clinical dietetics as selected by the faculty.

THE DEPARTMENT OF HEALTH SYSTEMS MANAGEMENT AWARD

To Caryn Marie Bing and Julie Ann Grego, outstanding graduate students as selected by the faculty.

THE OCCUPATIONAL THERAPY FACULTY AWARD

To Jeanne Ericsson Lewin, the student who demonstrated the greatest potential for contribution to the field of sensory integration as selected by the faculty.

SPEECH AND HEARING SCIENCES AWARD

To Illeane Schwartz, the outstanding graduate student as selected by the faculty.

BERNARD R. PENNINGTON MEMORIAL AWARD

To Marie Coglianese, for excellence in pastoral service as selected by the faculty in the Department of Religion and Health.

THE AESCULAPIUS AWARD

To Paul N. Gorman, M.D., resident, Department of Internal Medicine, for outstanding resident-physician as voted by the students.

THE DANIEL BRAINARD AWARD

To Susan K. Jacob, Ph.D., Assistant Professor of Anatomy, for outstanding teacher in the basic sciences as voted by the graduating medical students.

THE PHOENIX AWARD

To Robert G. Zadyak, M.D., Assistant Professor of Psychiatry, for outstanding physician-teacher as voted by the graduating medical students.

THE COLLEGE OF NURSING UNDERGRADUATE FACULTY AWARD

To Susan Dean-Baar, M.S., Assistant Professor of Nursing, for outstanding teacher as voted by the graduating students.

THE COLLEGE OF HEALTH SCIENCES FACULTY AWARD

To Lee D. Thompson, Ph.D., Assistant Professor, College of Health Sciences, for outstanding teacher as selected by students.

THE GRADUATE COLLEGE AWARD OF APPRECIATION

To Mark H. Lepper, M.D., Dean, The Graduate College, 1981-1983, in gratitude for outstanding guidance and support to the Graduate College.

Open New Center for Bone Marrow Transplants

Over the past fifteen years, bone marrow transplantation has been used with increasing success in the treatment of human disease. Pioneering research in bone marrow transplantation carried out at a few institutions in this country and Europe has clearly shown that patients with otherwise fatal cases of leukemia, aplastic anemia and congenital forms of immune deficiency can be cured by this treatment.

In order to serve better the needs of patients in Chicago and the surrounding region who might benefit from this treatment, Rush-Presbyterian-St. Luke's Medical Center has established a comprehensive bone marrow transplantation center under the direction of Herbert Kaizer, M.D., Ph.D., formerly with the bone marrow transplantation program of the Johns Hopkins Oncology Center. Dr. Kaizer will also serve as director of the Section of Hematology/Oncology in the Department of Pediatrics.

Initially, research at the Medical Center will focus on the use of bone marrow transplants for the blood born cancers (i.e. leukemia and lymphoma) and aplastic anemia. Two major problems, however, prevent wider application of bone marrow transplantation, according to Dr. Kaizer. First, because transplant-related complications are frequently fatal when there is a significant genetic disparity between donor and recipient, successful procedures are generally restricted to transplants from a tissue-matched brother or sister. Second, even with a tissue-matched sibling, fatal complications still occur in 25 to 40 percent of the cases.

The research of the bone marrow transplantation center will concentrate on approaches to the solution of these problems. For patients without a tissue-matched donor, treatment programs will be instituted using the patient's own bone marrow that has been removed during a remission period, treated with drugs to destroy all cancer

cells in the marrow and then transplanted back to the patient. Dr. Kaizer will lead a research program at the Medical Center utilizing drugs (particularly a drug called 4HC) or monoclonal antibodies to eliminate cancer cells from the bone marrow after it has been extracted from the patient. "After these therapies," he reports, "some patients have been free of recurrent cancer for long periods of time and are probably cured."

In the case of bone marrow transplantation from tissue-matched sibling donors, Medical Center scientists will investigate methods for eliminating or ameliorating the graft-versus-host disease that is often a cause of treatment failure. One method involves the use of cyclosporine, a new drug that appears to have produced a significant decrease in complications of kidney, heart and liver transplants. Through the efforts of William Knospe, M.D., director of the Section of Hematology, the FDA approved Rush-Presbyterian-St. Luke's as one of a handful of American medical centers to test cyclosporine on patients undergoing bone marrow transplantation.

The key ingredients for the success of bone marrow transplants include not only research efforts but a sizeable multidisciplinary team and meticulous care in the

prevention and treatment of complications. The team assembled at the Medical Center includes nine physicians and scientists and a nursing staff of sufficient size to provide one nurse for every two patients. Also involved in the program will be nurse practitioners, nutritionists, social workers and data analysts. The initial hospital facility will utilize six beds which will be renovated to provide a relatively germ-free environment. Eventually the bone marrow transplant center will contain 14 or more beds devoted to care and research in this area.

F.M.

Elect New Officers of Medical Staff

Andrew Thomson, M.D., associate professor and senior attending physician, Department of Internal Medicine, is the new president of Rush-Presbyterian-St. Luke's Medical Center's 758-member medical and scientific staff.

Other officers serving with Dr. Thomson are Malachi J. Flanagan, M.D., president-elect; Charles M. D'Angelo, M.D., secretary; and Guy R. Matthew, M.D., treasurer.

In his role as president, Dr. Thomson serves as a member of the Executive Committee and as a Trustee of the Medical Center. He



Andrew Thomson, M.D., (center) new president of Medical Staff, with (from left) Robert J. Jensik, M.D., immediate past

president, and Malachi J. Flanagan, M.D., president-elect.

succeeds Robert J. Jensik, M.D., professor and senior attending physician, Department of Cardiovascular Thoracic Surgery, who served as medical staff president the past two years.

A graduate of Indiana University School of Medicine, Dr. Thomson has been with the Medical Center since 1963 after serving on the medical faculty of The University of Chicago and the University of Washington. He is a member of the board of the Illinois Institute of Technology, a trustee of the Chicago Symphony Orchestra, and a member of several medical societies.

President-elect, Malachi J. Flanagan, M.D., is senior attending physician and professor of urology. He completed residencies in surgery and urology at St. Vincent's Hospital in New York and the University of Illinois Hospital in Chicago and received his medical degree from Loyola University. A past president of both the Chicago Urological Society and the Illinois State Urological Society, Dr. Flanagan joined the Medical Center in 1968.

Charles M. D'Angelo, M.D., the new secretary of the medical staff, is senior attending physician and associate professor of neurological surgery. A graduate of the University of Vermont College of Medicine, he completed an internship and residencies in general surgery and neurosurgery at Yale-New Haven Hospital, and a postdoctoral fellowship in neurosurgery at Yale University College of Medicine. Dr. D'Angelo has been with the Medical Center since 1975.

Guy R. Matthew, M.D., treasurer, is senior attending physician and associate professor of diagnostic radiology and internal medicine. A graduate of Indiana University School of Medicine, he completed his internship and residency at Presbyterian-St. Luke's Hospital. He is currently president of the Illinois State Radiological Society. Dr. Matthew joined the medical staff in 1963.

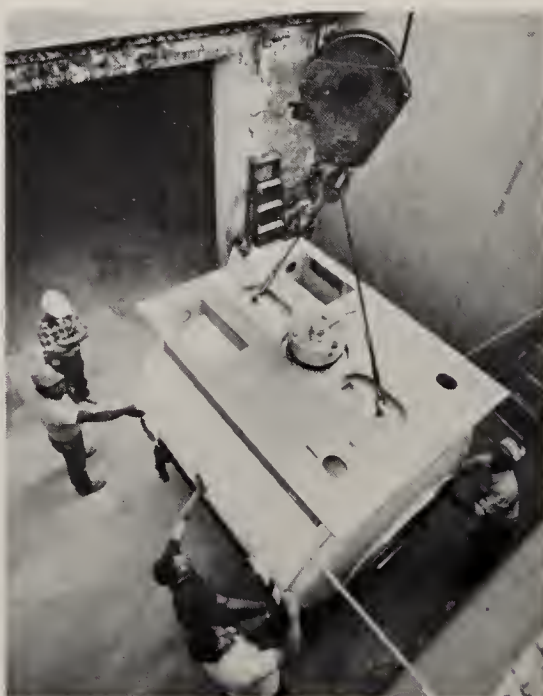
D.W.

Install NMR in Medical Center

What's donut-shaped, weighs five tons, has a magnetic field 10,000 times more powerful than that of earth's, and may revolutionize diagnostic medicine? The answer: Nuclear Magnetic Resonance (NMR).

This fall physicians and scientists at the Medical Center are beginning a series of research experiments on an NMR machine recently installed at a cost of \$2.5 million in the Colonel Robert R. McCormick Magnetic Resonance Facility on campus. This machine, the first installed in a hospital in the State of Illinois, was made possible by a grant from the Robert R. McCormick Charitable Trust.

NMR is the brainchild of the same computer technology that produced Computerized Axial Tomography (CAT), introduced 10 years ago and since proven to be an invaluable diagnostic tool. Unlike CAT and its x-ray cousins, however, NMR requires no radiation or contrast fluids to show picture-perfect images of the inside of the body. Instead, it makes use of magnetic fields and radio waves. Equally important, NMR scans reveal certain parts of the internal landscape that CAT scans or x-rays do not.



Workmen installing the Medical Center's Nuclear Magnetic Resonance machine.

"Since NMR focuses on hydrogen—the key component of water—it can provide information about soft tissues, such as breasts, lungs, and other organs composed mainly of water," explains Richard E. Buenger, M.D., chairman of diagnostic radiology and nuclear medicine. "X-ray radiation, in contrast, works best with solid material, such as calcium, and consequently provides clearer pictures of bones than soft tissue."

At the heart of the Medical Center's NMR machine is a magnet about the size of a cement mixer and with the power to attract metal within a radius of 29 feet. Because it was delivered in one piece, the NMR machine had to be first lowered into a 15-foot hole in the ground and then moved into a position in the cancer treatment center through a hole knocked into a wall.

"NMR will not be used routinely," insists Dr. Buenger. "Our first task is to establish where it is most effective and best used."

Dr. Buenger and other Medical Center radiologists are working with the new NMR to determine just how NMR can best be used in the diagnosis of disease. "What we know now is that we can create images without exposing patients to radiation and we can see flowing blood without injecting contrasting material into it," says Dr. Buenger.

"The organs have different structures within them that show up on certain kinds of x-rays and, even better, on CAT. NMR gives us different information about their chemical composition."

Researchers are also performing experiments to ascertain NMR's potential for diagnosing Alzheimer's disease; lung, uterine, and breast cancers; and heart and noncancerous brain disease. Among the questions they will be asking are: Can it detect the early symptoms of a stroke before that stroke's devastating effects are made? And can it predict Alzheimer's disease?

To date, NMR's most dramatic success is in the detection of multiple sclerosis which shows up on NMR scans of the brain, but not

on CAT scans or in other exams. It is also able to depict clearly the spinal cord (which CT and other diagnostic tools cannot). "We know NMR can reveal herniated discs," Dr. Buenger says. "Now we want to learn if it can eliminate the need for myelograms (spinal taps in which dye is injected around the spinal cord) and the discomfort which attends them."

"NMR is a revolutionary discovery—as original and important as the discovery of x-rays," says Dr. Buenger. He emphasizes, however, that it won't render CAT scanners obsolete."

"The two are very different diagnostic tools. Their results can be compared to that of an infrared and light photo. Each shows an image of the same thing but shows it differently. Each sheds light on the same subject but tells us different things about it."

W.L.

Economou Named Keith Professor

Steven G. Economou, M.D., has been named chairman of the Department of General Surgery and Helen Shedd Keith professor of general surgery at the Medical Center.

Dr. Economou, senior attending surgeon at Presbyterian-St. Luke's Hospital, has had a long association with the Medical Center and most recently was associate chairman of the Department of General Surgery. He came to the Medical Center in 1950 as a surgical resident, stayed on as a fellow in surgical oncology, and joined the medical staff in 1956.

Dr. Economou was educated at The University of Chicago and Hahnemann Medical College. He served his internship and residencies in surgery and orthopedics at St. Francis Hospital in Evanston, and was a fellow in pathology at Cook County Hospital.

A member of numerous professional societies, Dr. Economou is a diplomate of the American Board of Surgery and is the current president of the Chicago Surgical Society.



(From left) Stanton A. Friedberg, M.D., David D. Caldarelli, M.D., and Steven G. Economou, M.D.

Dr. Economou will succeed Harry W. Southwick, M.D., who has served as chairman of the department of general surgery since 1971 and as the Keith professor since its establishment. Dr. Southwick who will retire from these posts on January 1, 1984, has been a member of the medical staff since 1971 and is a past president of the Chicago Surgical Society and the Society of Head and Neck Surgeons.

Caldarelli Named to Friedberg Chair

David D. Caldarelli, M.D., has been named the Stanton A. Friedberg, M.D. professor of otolaryngology and bronchoesophagology.

Dr. Caldarelli, senior attending physician, is chairman of the Department of Otolaryngology and Bronchoesophagology. He earned his baccalaureate degree from the University of Wisconsin, his M.D. from the University of Illinois College of Medicine, and a master's degree in physiology from the University of Illinois Graduate College.

Dr. Caldarelli came to Rush in 1974 from St. Francis Hospital in Evanston, where he was chairman of the section of otolaryngology. He

is a member of numerous professional societies and has published extensively in his field.

Dr. Friedberg, for whom the chair is named, has been a member of the medical staff for 45 years, and is a nationally-recognized figure in diseases of the ear, nose and throat. Patients and friends of Dr. Friedberg helped to establish the named professorship, full funding for which was announced at the September meeting of the Board of Trustees of the Medical Center.

Procedure Combines Surgery/Radiation

A cancerous tumor of the pancreas had surrounded the patient's intestinal artery. If the surgeon removed the artery to get rid of all the tumor, the intestine would also be destroyed. Fortunately, however, the surgeon didn't have to sacrifice the intestine thanks to a procedure called intraoperative radiation therapy involving surgeons at Rush-Presbyterian-St. Luke's Medical Center and the Medical Center's Department of Therapeutic Radiology.

Through this cooperative effort, the surgical patient was brought di-

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rectly from the operating room to the Woman's Board Cancer Treatment Center. Once there, radiologists used a high-energy linear accelerator to aim a powerful beam of electron radiation directly at the cancer site, visible through the surgical opening.

"Intraoperative therapy is the best way to destroy cancers located deep inside the body while protecting nearby healthy tissue from the affects of radiation," says Frank Hendrickson, M.D., chairman of the Department of Therapeutic Radiology.

"Organs and other structures adjacent to a tumor cannot safely tolerate the high doses of radiation needed to kill the cancer," says Dr. Hendrickson. "In intraoperative therapy, we can move aside organs positioned above the cancer, covering them with sterile sheets of lead shaped by the surgeon in the operating room. Radiation does not penetrate the lead," he adds. "The organs lying behind the cancer site are protected from radiation because the linear accelerator controls how deeply electron radiation travels into the body, which is something you can't do with a conventional x-ray machine."

The trip from surgery to therapeutic radiology takes less than ten minutes and the patient is connected to portable anesthesia equipment.

"The whole surgical team comes down with the patient," says Dr. Hendrickson. "We had this procedure in mind when we designed the Cancer Treatment Center. The linear accelerator is located only fifty feet from the elevators that bring the patient from surgery."

The room housing the linear accelerator has a permanent anesthesia machine and heart monitor, but isn't as sterile as an operating room. According to Dr. Hendrickson, the patient's slight risk of getting an infection is outweighed by the benefits of intraoperative therapy.

"The results of this treatment have been encouraging," says the cancer researcher. "Rush is one of only a few medical centers in the coun-

try using intraoperative therapy, but no one has been doing the procedure long enough to know for sure if it's a significant improvement in cancer care."

Since late last year, physicians at the Medical Center have used intraoperative radiation therapy to treat cancers of the pancreas, colon, stomach, and bile ducts.

"We are trying to plan this procedure ahead of time as much as possible," says Dr. Hendrickson. "But since a surgeon doesn't always know the exact extent of the cancer problem before he operates, our staff is ready to assist at any time." F.M.

Communications to OR Speeds Diagnosis

Last year, if a Presbyterian-St. Luke's Hospital surgeon wanted to see a tissue sample and discuss a differential diagnosis with a pathologist during surgery, it was necessary to break scrub, carry the specimen to the pathology area (about a five minute walk), wait for the tissue sample to be frozen and a slide made, review the material with the pathologist, then return to the surgical area, rescrub, and resume the surgery. All the while the patient was still under anesthetic,



John R. Dainauskas, M.D., prepares to broadcast diagnosis from pathology lab to operating room via new communication system.

and the rest of the surgical personnel were waiting in the operating room.

If the surgeon chose to remain in the operating room and wait for a diagnosis from pathology, not only was there no opportunity to view the tissue sample, but the elapsed time between when the specimen left the operating room and when a typed pathology report came back was at least 20 minutes.

This is a common delay at most hospitals, but things at Rush-Presbyterian-St. Luke's Medical Center have changed. Thanks to a sophisticated communications system between the operating rooms and the Department of Pathology, it now takes 30 seconds for a tissue specimen to travel from surgery to pathology via pneumatic tube. Once processed, the frozen section slides made from the specimen are televised directly into the operating room; and the pathologist reads the diagnosis over the intercom. The time between when the specimen leaves the operating room and when the diagnosis is announced can be as short as five minutes, reducing the amount of time a patient is under anesthesia. The physician can then proceed with the surgery without ever breaking scrub.

One of the first of its kind in the country, the system consists of a Hitachi three-color tube television camera attached to a microscope, television monitors in each operating room, intercom systems between each surgery suite and pathology, and the dedicated pneumatic tube for delivery of specimens.

Conceived by Ronald S. Weinstein, M.D., the Harriet Blair Borland professor of pathology and chairman of the Department of Pathology, and L. Penfield Faber, M.D., associate vice president and associate dean, surgical sciences and services, the system was designed by Lester Wolf, chief electronics engineer, Department of Biomedical Communications. It was made possible by the philanthropy of Mr. and Mrs. John Antalek.

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"Because people on both the surgery and pathology teams may have different information about the patient, this system gives an opportunity for all relevant information to be discussed during surgery," says Dr. Weinstein.

In addition, points out Dr. Faber, the system has been of tremendous educational benefit to surgical nurses and residents. "Operating room personnel now have the opportunity to view the tissue structure of the specimen on the television screen and hear the interchange between the surgeon and the pathologist. It's an experience they couldn't have had when the surgeon left the operating room to view a specimen under a microscope."

Because each broadcast is videotaped, the consultative and educational benefits also go beyond the operating room. Often a patient is being seen by physicians from several services, and these doctors can now view the tape and get a better understanding of the entire differential diagnosis. J.P.

Name Mila I. Pierce, M.D. Distinguished Alumna

Mila I. Pierce, M.D., practicing physician, teacher and researcher for 57 years, has been named Distinguished Alumna for 1983 by the Alumni Association of Rush Medical College. A 1925 graduate of the college, Dr. Pierce was cited for her professional accomplishments as a pediatric hematologist and for her outstanding record as a humanitarian, educator and compassionate physician.

Dr. Pierce is a distinguished professor of pediatrics of the honorary faculty of Rush Medical College, and, for the past 10 years, has headed the pediatric hematology section at the Medical Center which she established together with a fellowship program. She also holds the title of professor emeritus at both The University of Chicago and Northwestern University, and had served on the staff of Chil-

dren's Memorial Hospital before coming to Rush-Presbyterian-St. Luke's Medical Center.

It was during her residency in pediatrics that Dr. Pierce, whose parents were both physicians, first became interested in childhood acute leukemia. Most of the 49 scientific papers that she has published to date report on her research of that disease and she continues to test new treatment protocols as an active member of the Children's Cancer Study Group.

Her honors include the Brennaman Award which is the highest recognition bestowed by the national pediatric society; the Physician's Recognition Award of the Illinois Chapter of the American Academy of Pediatrics, and The University of Chicago Professional Achievement Award.

In presenting the 1983 award to Dr. Pierce, her classmate, Paul Rhoads, M.D., the 1979 Rush Medical College Distinguished Alumnus, said "As students we were taught that we had three obligations: to take care of our patients with as much skill and devotion as we could command; to, by observation and experiment, add a little to the sum total of medical knowledge; and to teach the students who were following us as well as our patients.

"To be a complete physician, we were supposed to do these things," Dr. Rhoads said. "I can think of no one who has succeeded as superbly as Mila Pierce." K.K.K.

Study Results Show Dreams Help Us Cope

The researcher asked the subject to describe her dream.

"I was a pencil," the woman replied, "in a pencil sharpener."

"You mean you were being ground up?" asked the researcher.

"No," the woman answered, "I was getting sharp."

The message in this divorced woman's dream told Rosalind D. Cartwright, Ph.D., professor and chairman, Department of Psychol-

ogy and Social Science, that her subject was learning to cope with the emotional distress of her divorce.

Dr. Cartwright's four-year study, supported by a grant from the National Institute of Mental Health, tested several hypotheses about the function of dreaming. Her results are currently being prepared for publication.

Dreaming, says Dr. Cartwright, usually helps people deal with their feelings and anxieties and find solutions to problems. It also helps people adapt to major life changes, except when the change is accompanied by depression.

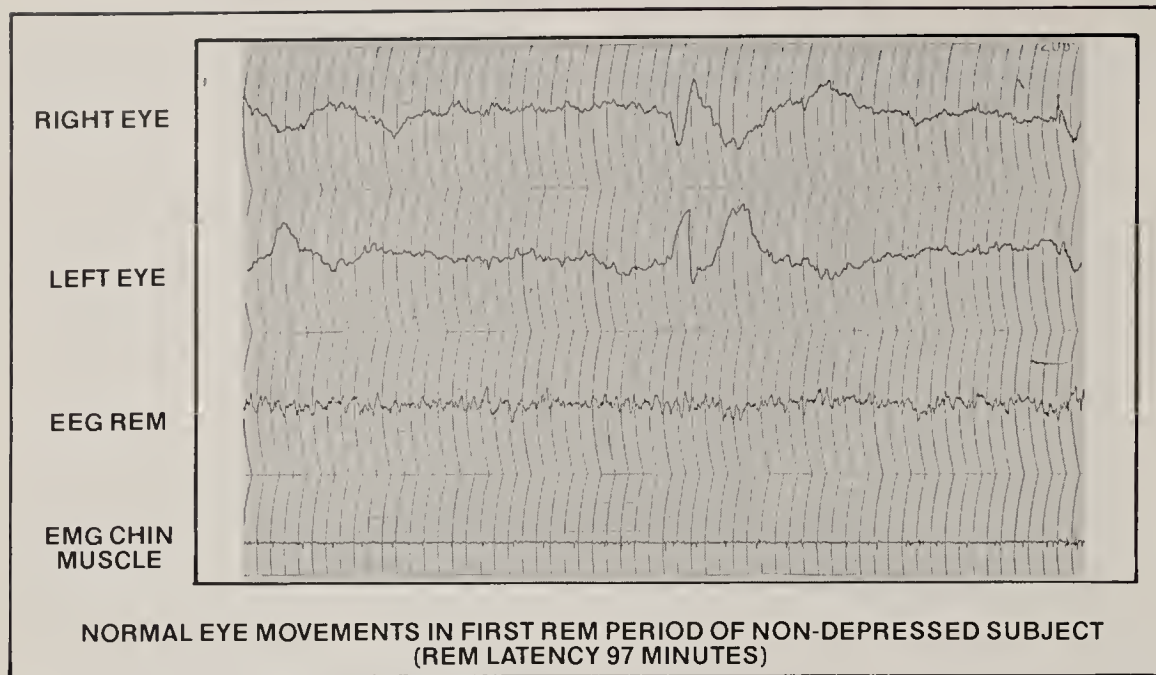
"Depressed people have dramatically different sleep and dreaming patterns than those not depressed," says Dr. Cartwright. "Their dreams are too long and begin too soon. This may be a psychological response to try to deal with information they find too upsetting to deal with during normal periods of dreaming sleep."

Unfortunately, depressed persons also dream in chaotic images instead of images that build slowly into a story. Since their dreams have no clear focus, they can't use them to help discharge their emotional load, according to Dr. Cartwright.

In the course of her study, Dr. Cartwright and her assistants monitored the dreaming sleep of 29 women—including both divorcing, depressed women and divorcing, nondepressed women. These subjects were tested for, and then categorized according to, their self-perception; those who thought of themselves primarily as a wife were called "traditional" and those with varied roles "liberated." A control group of happily married women was also included in the study. All participants, chosen from the general population, were between the ages of 30 and 55.

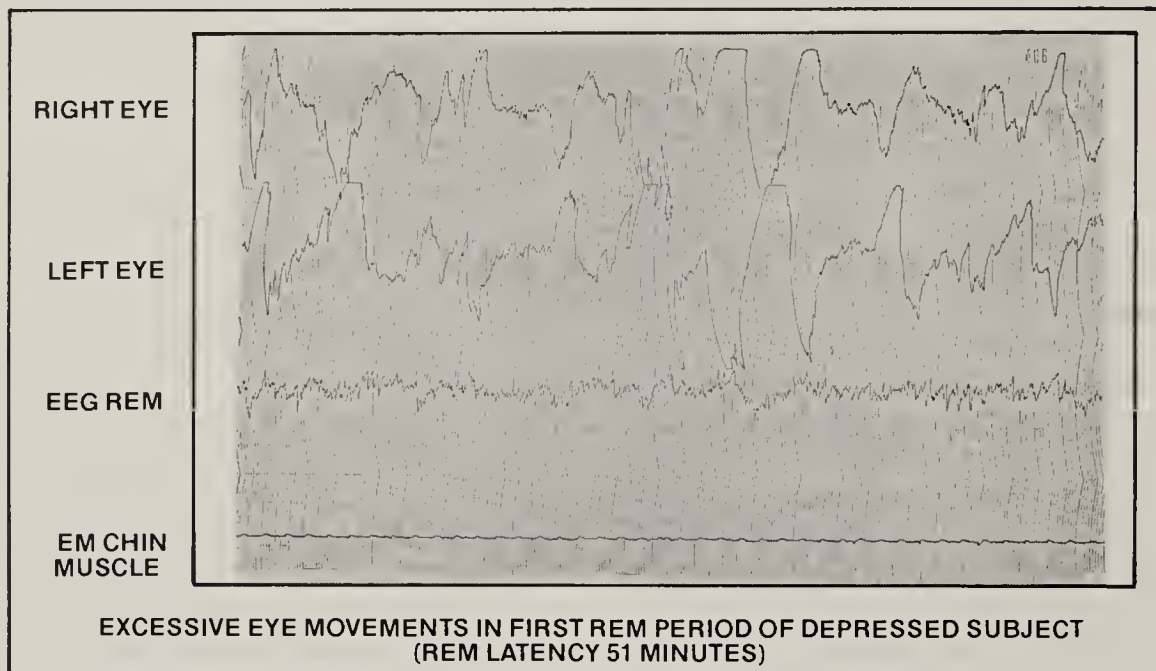
For six nights (three nights per week during two consecutive weeks), subjects slept in the Medical Center's Sleep Disorder Service Center, of which Dr. Cartwright is the director. When special recording devices indicated they had en-

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(Top) normal eye movement of nondepressed subject in first REM period of sleep.

(Below) excessive eye movements of depressed subject in same period.



tered the dreaming stage of sleep, subjects were awakened and asked to describe their dream. Follow-up evaluations of their sleep/dreaming patterns were completed one to two years after this initial test.

At the beginning of her research, Dr. Cartwright predicted that traditional women would have more trouble dealing with their divorces and that their dreams would not help them adapt to this major life change. Results of this aspect of the study, reported in the *Archives of General Psychiatry*, indicated that regardless of how bad their marriages were or who initiated the divorce, traditional women were the most depressed and had the most sleep abnormalities.

The study also considered the effects of a major life change on dream content, and results indicated that divorcing women who were not depressed had more productive dreams. They dreamt in the widest time frame—past, present, and future. They also dealt with marital status issues in their dreams. The divorcing and depressed women, however, dreamt only about the past, yet never saw themselves as a wife in their dreams nor dealt with the loss of that role in their lives.

"It was as though they had erased that part of their lives completely," says Dr. Cartwright. But by the time the follow-up was made, she found the quality of the depressed wom-

en's dreams greatly improved. The mood of their dreams became more positive, they began to see themselves as a separated or ex-wife, and the time frame of their dreams expanded.

The study provided insight into why women become depressed about divorce. "The women most depressed about the divorce had become emotionally dependent on their husbands," says Dr. Cartwright. "The subject who dreamt that she was a pencil had never balanced a checkbook or filled out an income tax return. In her dream, she had become the instrument needed to do this kind of paperwork. It was a very vivid picture of growing self-reliance."

Understanding why people become depressed about a major life change and how dreaming normally helps us cope with such changes raises the possibility of introducing therapy to reduce the depression level and allow the natural coping function of dreaming to take over.

Dr. Cartwright's next study on dreams and divorce will focus on men. "I think men become depressed about divorce because of a sense of personal failure rather than from a dependency problem," says Dr. Cartwright. "That's just a hunch right now, but we'll find out. Their dreams will tell us." J.P.

First U.S. Test of New Herpes Vaccine

A meeting three years ago at a conference on herpes in Atlanta, Georgia, has resulted in a collaborative effort between George D. Wilbanks, Jr., M.D., the John M. Simpson professor and chairman of obstetrics and gynecology at Rush-Presbyterian-St. Luke's Medical Center, and British researcher, Gordon R. B. Skinner, M.D., of the University of Birmingham (England) Medical School, to test a new herpes vaccine. Already tested by Dr. Skinner on 500 people in England, the vaccine shows great promise in protecting the sexual partners of herpes sufferers. It also may help

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relieve the severity and reduce the number of herpes outbreaks in those already infected with this sexually-transmitted disease.

Dr. Wilbanks' initial interest in the Skinner vaccine arose out of his conviction that herpes and cervical cancer were in some way linked and he was drawn to the idea of developing a safe vaccine to eliminate herpes that he hoped might also help to eliminate cervical cancer. Over the last three years, he has been conducting two herpes-related research studies. In the first, he is attempting to transform human cervical cells to cancer cells *in vitro* by introducing herpes, which he succeeded in doing in an earlier study with animal cervical cells.

In the second of his herpes-related research projects, Dr. Wilbanks has been exposing rhesus and cebus monkeys to herpes virus. Some of the monkeys were inoculated with Skinner's vaccine before exposure; others received no inoculation.

The results of the animal experiments—like Dr. Skinner's own results with humans in England—are promising. Of the monkeys inoculated with the Skinner vaccine, none developed herpes.

To further test the vaccine's effectiveness in protecting against herpes and to determine if it will alleviate the severity and incidence of herpes outbreaks in those with the disease, Drs. Wilbanks and Skinner will run simultaneous human trials on three different patient groups: the sexual partners of herpes sufferers; patients who have had only one outbreak of herpes and are vaccinated within a month of that outbreak; and patients with severe recurring infections.

These studies, to be conducted at Rush-Presbyterian-St. Luke's Medical Center and, in England, at the University of Birmingham Medical School, will each involve 300 patients; some of each group will be inoculated with the vaccine and the others will be inoculated with similar material except for the active vaccine. Participants in the study will not know whether or not they are getting the real vaccine.

This double blind method will eliminate any psychological or external factors that may have played a part in Skinner's original findings.

After three years of study and follow-up, the two researchers will compare results. During this period primate studies here at the Medical Center will continue to focus on perfecting the vaccine and determining appropriate dosage levels.

While Rush-Presbyterian-St. Luke's Medical Center is the only institution in the United States testing Skinner's vaccine, the race to develop herpes vaccines is on, Dr. Wilbanks says. Skinner's vaccine differs from some of those now being developed, however, because it is not a live vaccine, but a dead vaccine, made from a portion of the coating of killed herpes virus treated to get rid of any DNA which might transform the cell itself or cause cancer.

"We have proved the safety of the vaccine," says Dr. Wilbanks. "In order to make it available to the general public we must now prove it is effective as well as safe."

Once the effectiveness of the vaccine has been established, many other medical and public health questions will then need to be answered. These, according to Dr. Wilbanks, include: How long does the vaccine protect against herpes? How should it be administered? At what age should it be given? Who should receive it?

In the meantime, Dr. Wilbanks points out, research efforts to relieve the symptoms of herpes and to determine the correlation between herpes and cervical cancer continue. W.L.

CME and NCE Courses Now Aired Over Cable TV

In addition to first-run movies and live sports coverage, cable television is now becoming a vehicle for continuing education programs for health professionals.

Rush-Presbyterian-St. Luke's Medical Center and several of its network hospitals are cooperating

in a pilot project for the production of a continuing medical education (CME) and a nursing continuing education (NCE) program via cable TV.

The first of these programs featured James A. Hunter, M.D., senior attending physician and professor, cardiovascular thoracic surgery, Rush-Presbyterian-St. Luke's Medical Center. His presentation of "Peripheral Vascular Examination," taped in the Medical Center's television studio, was telecast two weeks later from the Medical Center via airwaves to Copley Memorial Hospital in Aurora, Illinois, through an Aurora cable company. The cable signal was scrambled so that only health professionals at Copley could view the program. Following the presentation, physicians in the audience at Copley transmitted questions via teleconference equipment to the Medical Center studio and Dr. Hunter responded to them "live" over the cable transmission.

"Televised CME programs can transmit such things as radiographs and microscopic slides with enormous clarity," said Harold A. Paul, M.D., M.P.H., associate dean, Continuing Medical Education and Educational Development, Rush Medical College; and moderator for Dr. Hunter's program. "Since this format also gives physicians an opportunity to interact immediately from several sites, it has tremendous potential to revolutionize continuing medical education over the next five years."

A second program in the project—a nursing continuing education program—was transmitted via cable between Rush-Presbyterian-St. Luke's Medical Center and West Suburban Hospital Medical Center in Oak Park, Illinois. Similar in format to the medical program, it began with a prerecorded obstetrics grand rounds entitled "Eclampsia," introduced by Faith M. Jones, Ed.D., R.N., director, nursing continuing education, Rush-Presbyterian-St. Luke's Medical Center. West Suburban nurses who viewed the program asked questions of the Presbyterian-St. Luke's Hospital

Rush Rounds

birth rooms nursing staff who participated in the grand rounds. Their live answers were transmitted over the cable transmission from the Medical Centers television studio.

About 50 physicians at Copley and 35 nurses at West Suburban participated in these programs, and the majority rated this format for continuing education programs as "excellent." J.P.

Master's Program Offered in Medical Physics

A program offering a master of science degree in medical physics was introduced in the College of Health Sciences of Rush University in September, 1983. Its director is Lawrence Lanzl, Ph.D., senior scientist and professor, medical physics. Medical Physics applies the concepts and principles of physics to the diagnosis and treatment of human disease. Areas of medical physics include dosimetry, imaging applied to medicine, radiation sources, physics of radiation therapy, physics of diagnostic radiology, physics of nuclear medicine, and radiation protection.

"A medical physicist is a consultant to the physician on questions like 'How much radiation should be used to treat a specific cancer patient' and 'How do we penetrate a tumor without destroying surrounding tissue?'" says Dr. Lanzl.

"The physicist is concerned with problems relating to the application of physical apparatus in treatment."

The medical physics master's program is part of the Department of Related Health Programs, College of Health Sciences, and is offered in cooperation with the Department of Therapeutic Radiology of Rush Medical College. Students in this two-year program will be trained in physics as applied to radiation therapy, diagnostic radiology, nuclear medicine, radiation safety, research, and radiobiology, as well as in such subjects as anatomy, physiology, and computer science.

One of the clinical areas for stu-

dents will be the Woman's Board Cancer Treatment Center which is the site of 25,000 patient visits each year. The therapeutic radiation treatment facilities at the Center include three powerful radiation machines (two linear accelerators and one cobalt unit), x-ray equipment for treating skin cancers, and a hyperthermia chemotherapy room where patients may be treated with heat or drugs in a precisely timed sequence before and after radiation therapy. A nuclear magnetic resonance machine has been installed recently in the Department of Radiation Therapy and Nuclear Medicine. D.W.

New Software Aids Health Care Planning

Managers at Rush-Presbyterian-St. Luke's Medical Center are getting help making future-oriented financial and management decisions from a software program called the Marketing, Clinical, and Financial Information System (MCFIS).

MCFIS cross-references information from the billing system and the medical record abstract system to enable the analysis of diagnoses,

surgical procedures, physician, payor, age, sex, admission source, community origin, and detailed charge statistics for all hospital procedures.

"One of the greatest benefits of MCFIS," says Marie Sinioris, M.P.H., assistant vice president, planning and government liaison, "is that it answers 'what if' questions. For example, questions such as 'what would happen if a specific clinical program's services increased by 100 percent over the next two years?' With MCFIS we can gauge the impact on staffing requirements, ancillary utilization, related clinical programs utilization, average and total costs and charges, and the markets which that program serves."

It took three years to develop, refine, and implement MCFIS, with the help in the past year of consultants from Price Waterhouse. During this time, it was becoming clear that changes would be made in federal regulations governing Medicare and Medicaid reimbursement to health care institutions. In October, hospitals across the country began adapting to a system that pays Medicare bills on the basis of diagnosis rather than cost.

MCFIS anticipated these changes. For example, the new formula for Medicare reimbursement



(From left): Bill Richardson, media services, videotapes Harold A. Paul, M.D., and James

A. Hunter, M.D., for cable TV CME course.

RushRounds

uses diagnosis-related groups (DRGs); and MCFIS is ready for the DRGs. The Medical Center is using information already in its computer and systems already developed to analyze and order the data to help develop recommendations on where Rush-Presbyterian-St. Luke's Medical Center can focus its resources so that patients can be cared for most efficiently.

Because MCFIS has proven so useful to the Medical Center, it was decided to offer the system, with the support of Price Waterhouse, to other health care institutions. MCFIS is already in use at MacNeal Memorial Hospital in Berwyn, Illinois, and is being installed at Fairfax Hospital Association in Virginia; Shands Medical Center in Florida; and Alverno Administrative Services, Inc., a subsidiary of the Sisters of St. Francis, in Indiana.

"Health care resources are scarce," says Sinioris. "By putting the Rush experience to work elsewhere, we're helping patients around the country get better care."

J.P.

Fertility Treatment Adds Four to Family

The downstate Illinois farm town of Verona increased its population by 1.6 percent when town resident Patti-Jo Tinsley gave birth to quadruplets June 28 at Rush-Presbyterian-St. Luke's Medical Center.

The arrival of David Andrew, Russell Benjamin, Josie Sue, and Kenneth Mack caused quite a stir as news of the multiple birth spread through the town of 250 (now 254).

Mrs. Tinsley, who said she and husband Charlie had "always wanted a big family," had sought to get pregnant for eight years and, before coming to the Medical Center, had been advised to have a hysterectomy.

Ewa Radwanska, M.D., a fertility specialist at the Medical Center, whom Mrs. Tinsley finally consulted, had very different advice. Mrs. Tinsley's problems included endometriosis and anovulation.



Marie Sinioris, M.P.H., confers with Price Waterhouse consultants (from left) Steve Heck, Dave Burik and Don Smith, at recent

conference to introduce MCFIS to health institutions.

These conditions are usually treated with the use of drugs. Dr. Radwanska first prescribed treatment with Danocrine to suppress endometriosis and then Pergonal, a fertility drug that induces ovulation. However, even carefully monitored, this treatment sometimes stimulates multiple births. In a short time Mrs. Tinsley was pregnant with not one but four babies. It was considered a complication and Mrs. Tinsley was under the prenatal care of an obstetrician specializing in high-risk pregnancies, Stavros Douvas, M.D., assistant professor, obstetrics and gynecology.

A particularly motivated patient, Mrs. Tinsley was hospitalized at Presbyterian-St. Luke's from her 24th week of pregnancy, a precaution her obstetrician believed would prevent a too-premature birth and allow her babies to mature as much as possible. (At their birth, six weeks early, all the babies weighed more than four pounds.) An ultrasound test every two weeks checked for abnormalities (there were none) and on size.

Mrs. Tinsley is one of many people who have benefited from ad-

vances in the relatively young field of reproductive endocrinology and infertility, and from the care and research of Medical Center specialists in this field.

Director of the reproductive endocrinology/infertility program at the Medical Center is W. Paul Dmowski, M.D., Ph.D., professor of obstetrics and gynecology at Rush University. A recognized specialist in the area of endometriosis, Dr. Dmowski's studies center on pinpointing the cause of this condition (often called the career woman's disease).

The nickname is something of a misnomer, according to Dr. Dmowski. It developed because it was believed the disease affected mostly upper-class women who postponed pregnancy to pursue careers. In fact, the disease affects a heterogeneous group of women who have (for whatever reason) postponed pregnancy or have been unable to conceive.

"Mild endometriosis inhibits fertility," says Dr. Dmowski, "but it is relatively easy to reverse and, in fact, is actually helped by pregnancy. Pregnancy keeps most

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women free of the disease for a prolonged period of time." Success in reversing infertility in patients with more severe cases of endometriosis, however, is less dramatic.

Much of Dr. Ewa Radwanska's research has centered on progesterone—a hormone critical for inducing pregnancy. "All our patients now have progesterone measured before and during treatment. It's a good index of determining whether they ovulate and have fertile cycles or not," says Dr. Radwanska, associate professor, obstetrics and gynecology.

The newest addition to the Medical Center fertility team is Lourens Zaneveld, D.V.M., Ph.D., a reproductive physiologist and biochemist. He is working in the area of sperm physiology to improve evaluation and treatment of male infertility.

He, together with Drs. Dmowski and Radwanska, is setting up a laboratory which will perform all standard semen tests, including those for sperm number, morphology,

motility, and ability to penetrate cervical mucus. In addition, says Dr. Zaneveld, the new laboratory will also give the fertility specialist the capability of performing hamster egg tests that measure fertilizing ability of human spermatazoa.

For those couples for whom other treatment, including surgery, has failed to result in pregnancy, the fertility team suggests *in vitro* fertilization, a new technique available at the Medical Center.

"Using all the different methods at our disposal, we estimate that about fifty percent of the women who walk through our doors seeking treatment eventually become pregnant," says Dr. Radwanska, as she thumbs through her "success book," a large looseleaf binder whose pages document the procedures each successful patient has undergone. The "success book" now includes 70 cases.

"We feel that if we can make couples just a quarter as happy as Mr. and Mrs. Tinsley are with their quads then we're doing a good job."

W.L.



David Andrew Tinsley, one of quadruplets born at Medical Center, is admired by his mother, Patti-Jo Tinsley (center), his grand-

mother and great-grandmother. (Chicago Sun-Times, 1983. Photo by James Klepitsch, reprinted with permission.)

Merits of Diagnostic Tests Were Discussed Last Week

The Biology of Depression Makes Physicians Anxious

By **BRYCE NELSON**

The National Institute of Mental Health has labeled severe depression the nation's No. 1 mental health disorder, affecting as much as 5 percent of the population at any given time. The figure is unavoidably imprecise: Depression is difficult to separate from the ailments that can mask it—alcoholism or chronic pain, for example—and from the illnesses of which it can be a symptom. The result has been an ongoing search among mental health experts for a reliable test for depression.

The newest entry, developed by Dr. Hector C. Sabelli, director of the psychobiology laboratory at Chicago's Rush-Presbyterian-St. Luke's Medical Center, received national attention last week after research results were published in the June 10 *Science* magazine and in the current issue of the *Journal of Clinical Psychopharmacology*. According to Dr. Sabelli, examinations involving hundreds of people showed that when compared to healthy individuals, 70 percent of the depressed patients had markedly lower levels of a brain chemical called 2-phenylethylamine, an amphetamine-like substance. Successful treatment of their depression restored the chemical to its normal levels.

What was important to psychiatrists was that the chemical is broken down in ways that can be easily measured. The new test, for example, measures a key breakdown product, phenyl acetate, which is excreted in the urine.

Dr. Sabelli's work has yet to receive wide scientific review. However, all such biological tests for depression have advocates and detractors.

"There is no terribly useful biological test for clinical practice in psychiatry today," said Dr. Walter A.

Brown, a professor of psychiatry and human behavior at Brown University who helped review the subject for the American Psychiatric Association. The review was prompted by wide-spread use of the tests over the last three years as tools to diagnose depression.

Dr. William Z. Potter, chief of the clinical psychopharmacology section at the National Institute of Mental Health, said "The institute's position is that all the biological tests for depression are primarily research tools," albeit "essential tools."

"Our profession has always promised too much" in the way of diagnostic tests for depression, said Dr. David J. Kupfer, chairman of psychiatry at the University of Pittsburgh School of Medicine. But, he said, "There's a great pressure in psychiatry, as it moves closer to medicine, to provide quantitative measurements."

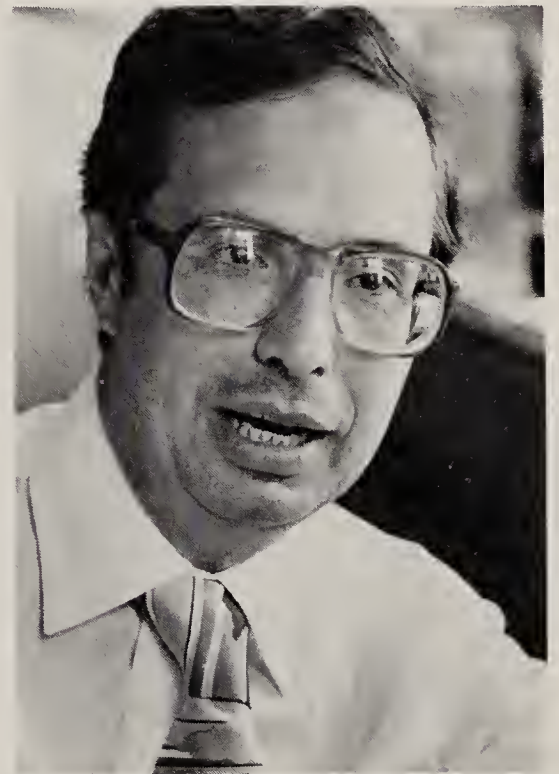
Tests for depression also offer psychiatrists and psychiatric hospitals one of the few opportunities for conducting examinations that are reimbursed by insurance companies and other third-party payers. Some physicians have welcomed the tests because they assuage patients' fears with the certainty of diagnosis and the promise of treatment. Patients have also sought quantitative tests because they might establish that depression is biologically based and thus beyond the patient's control.

The new research developments at Rush medical center have come at an opportune moment. Leaders in the mental health profession recently agreed that the most popular diagnostic tool, the dexamethasone suppression test or DST, cannot be relied upon for routine diagnosis of depression or treatment decisions. The warning was issued at a workshop at the National Institute of Mental Health

last year and at the American Psychiatric Association meeting in New York in May.

The DST is a blood analysis that determines whether cortisol, a hormone secreted by the adrenal glands, is suppressed following ingestion of dexamethasone. In most healthy people, dexamethasone temporarily suppresses the secretion of cortisol. In as many as half the depressed patients, the secretion is not suppressed.

The problem with the DST, the experts said, is that it identifies large numbers of people as being depressed when they are suffering from ailments other than depression. It fails to identify as many as half the people who, in subsequent examinations, are found to be clinically depressed. The DST, its evaluators concluded, is a needless expense that gives a false sense of diagnostic precision.



Hector C. Sabelli, M.D., Ph.D.

The biological diagnosis of depression is always complicated by the lack of a foolproof biological or biochemical definition of the disease. Many scientists believe that abnormalities in brain chemistry cause depression, but they have not established what these abnormalities are or how they lead to illness. The tests, then, can meas-

ure only the biochemical abnormalities associated with depression.

The proponents of biological tests acknowledge such limitations. They are quick to point out, however, that biological measures can form part of a battery of tests used to diagnose patients who present a variety of symptoms and no single disease profile. Some psychiatrists also note that tests dealing with brain biochemistry can measure the effects of drug therapies, and thus are useful in selecting the antidepressant drug most appropriate for treatment and in predicting treatment response and the possibility of relapse as dosages are changed or the drug is withdrawn.

One solution to the problem of

determining who is and is not clinically depressed is to use more than one technique. At the Rush center in Chicago, for example, three tests are given to each person suspected of depression. The first is the DST. The second test is a urinary assay for the norepinephrine metabolite, 3-methoxy-4-hydroxy-phenylglycol or MHPG, another breakdown product of a brain chemical. The third is Dr. Sabelli's test, which he warns is still in a trial stage. "This is only the first study," he said in an interview, referring to the published results. "There may be other factors."

Both proponents and critics of biological tests agree that these measures cannot replace a careful medical interview, much as drug

therapy can supplement, but not replace psychotherapy in treating a disease that has physiological and psychological components. Depression, psychiatrists explain, is best detected by a good clinical examination in which the doctor looks for symptoms that have lasted several weeks, including change in appetite, loss of sleep, lack of energy in the morning, sexual dysfunction and suicidal thoughts.

"The clinical examination is the gold standard," Dr. Potter observed. "The biological tests are much less predictive." Said Dr. Kupfer: "For routine assessment, we don't have a test yet. Perhaps in eight or 10 years, we might have some answers."

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